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SEVENTH INTERNATIONAL CONGRESS
OF
HYGIENE AND DEMOGRAPHY.

REPORTS
OF THE
MEETINGS AND DISCUSSIONS

HELD IN LONDON, AUGUST 10—17, 1891.

Being the Six Special Daily Numbers of **Public Health.**

L ARY

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PREFACE.

SOME few words of introduction are necessary to explain the origin and scope of this book. The importance of the Seventh International Congress of Hygiene and Demography led the Committee of the Society of Medical Officers of Health to consider that a daily report of its Proceedings was not only desirable, but necessary. During the sitting of the Congress such a work was undertaken, and an edition of PUBLIC HEALTH, the journal of the Society, was published daily.

The necessary speed with which the reports were condensed and prepared for the press has doubtless led to some errors and omissions, and those who have had most experience of the difficulties of such an undertaking will, we believe, the most readily forgive such shortcomings. These omissions we ask our readers to help us to repair in future numbers of PUBLIC HEALTH.

In addition to the reports of the Congress, the book contains new and valuable papers relating to the sanitary work now carried on in London. Those interested in this subject will find in the foregoing pages much reliable information given by those whose lives are spent in combating preventible disease. A brief glance at the index will show the wide scope of the subjects dealt with; and it is our hope that the present work may be the means of arousing greater interest in, and wider knowledge of, the all important branch of modern science—Public Health.

A. WYNTER BLYTH.

COURT HOUSE, MARYLEBONE,
August, 1891.

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* * * * * * * * * *

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PUBLIC HEALTH,

)FFICIAL ORGAN of the CONGRESS of HYGIENE and DEMOGRAPHY, 1891,

AND

The Journal of the Society of Medical Officers of Health.

AMME OF THE PROCEEDINGS AT OPENING MEETING, TO BE HELD T. JAMES'S HALL, AUGUST 10TH,

---

r of the meeting was originally fixed for three, but this has been altered, and all o have tickets must be in their places by two, or at latest quarter to three p.m., eedings commencing at three p.m.

ollowing is the official agenda :—

rt of the Permanent International Comittee, appointed at the Vienna meeting of

y Sir James Paget and seconded by Dr. eorge Buchanan, F.R.S.

CIAL AND OTHER ARRANGEMENTS.

rew Clark's dinner at the Royal College f Physicians to meet His Royal Highness he Prince of Wales, President of the Congress.

Royal College of Surgeons, nine p.m. to welve p.m. (This will be held in the Hunterian Museum and Library of the College in Lincoln's Inn Fields.)

eception by the Ladies' Committee (Presilent, Mrs. Priestley), at Messrs. Agnew's Picture Gallery, marked N on the plan, en a.m. to twelve noon.

THE METROPOLIS.

THIS, the first number of our special issue, is mainly devoted to the description of "types" of hospitals, mortuaries, infirmaries, and blocks of model dwellings; to the description of methods of dust disposal, of the metropolitan sewer system, and of general metropolitan administration. Thus, members of the congress desirous of studying the sanitary arrangements of this vast city will be able to know exactly what places to visit. The ordinary guide books give details as to public buildings, theatres, music halls, and the so-called sights of London generally, but here will be found collected in a convenient form, information of the most reliable character, for it is derived from the officers

Tyburn Brook flowed. This water became a little offensive a few years ago from a collection of mud which had gradually formed, but the lake was drained off and the whole of the mud removed. The gardens of the Zoological Society and of the Royal Botanic Society are both in Regents Park. On the east side of the park will be found flower gardens laid out in the English and Italian styles. Plants, not only of temperate climes, but also such sub-tropical plants as *Caladium*, *Canna*, *Ricinus*, *Dracœna*, *Ficus elastica*, and others are to be seen in numbers. Visitors will notice in this park especially the latest developments of arranging and massing colours for the sake of effect.

As a type of open spaces adjacent to the suburbs may be cited :—

Hampstead Heath, as secured for the public by the Metropolitan Board of Works, consisted of 220

ERRATA.

On page 26, in paragraph at foot, line 9, *for* "Surgeons," *read* "Physicians"; same paragraph, line 10, *for* "Mr.," *read* "Professor."

Page 74, line 40, *for* "Cruciform," *read* "Crescent-shaped."

Page 125, sixth and seventh lines from end of first col., *for* "the Presidential Address of Lord Basing," *read* "Sir Charles A. Cameron's Paper."

Page 130, line 12, *for* "Mr." George Porter, *read* "Sir" George Porter; same page, line 28, *for* "R. W." Smith, *read* "W. R." Smith.

Page 134, line 30, *for* "Grailly," *read* Grailey."

Page 142, 13th line from end of first col., *for* "Guitl," *read* "Gintl."

Page 157, line 48, *for* "Abbol," *read* "Abbott."

Page 173, line 46, *for* "Langdown," *read* "Langdon."

Page 176, line 28 from end of first column, *for* "Longstaffe," *read* "Longstaff."

acres, the manorial rights over which were purchased for £45,000. The additional space recently added, known as Parliament Hill Fields, consists of 265 acres, so that the whole open space now contains 485 acres. The cost of this latter portion was £305,000, of which the Board of Works found £152,500. The remaining amount was contributed by the Hampstead and St. Pancras Vestries, who gave £50,000, by the City Charities £50,000, and by public subscriptions, mainly promoted by Miss Octavia Hill, £52,500. For the preservation of the first portion of 220 acres (the manorial rights over which were ultimately purchased, as above stated), the public are mainly indebted to the spirited action of the copyholders of Hampstead, who successfully resisted the attempts of the late Sir Thomas Wilson, then Lord of the Manor, to build and make roads thereon. The charm of the Heath is not from its size, but from the beauty of its situation, its semi-wild character, and its associations. Leigh Hunt lived in the Vale of Health, and was visited there by all the literary celebrities of his time. Keat's Walk can be pointed out, and "Erskine House," where the great lawyer lived, is still in its old place.

The following is a list of the open spaces in the metropolis.

OPEN SPACES IN GREATER LONDON.

	Acres.
Finsbury Park	115
Stoke Newington Common	5½
Victoria Park	300
Regent's Park and Primrose Hill	450
St. James' Park	83
The Green Park	71
Hyde Park	400
Kensington Gardens	300
Hampstead Heath	485
Paddington Green	1½
Battersea Park	250
Southwark Park	63
Kennington Park	25
Thames Embankment Gardens	13
London Fields	27
South Hackney Common	5
Hackney Downs	50
Clapton Common	5½
North Mill Field	29
South Mill Field	28
Clapham Common	220
Wandsworth Common	160
Brook Green	6
Eelbrook Common	18
Parson's Green	4
Goose Green	6
Camberwell Green	1½
West Ham Park	80
Peckham Rye	64
Shepherd's Bush Common	8
Bostall Heath	55
Plumstead Common	110
Shoulder of Mutton Green	4
Tooting Common	207
Barnes Common	100
Kew Gardens	300
Richmond Park	2,250
Bushey Park	1,000
Wimbledon Common & Putney Heath	1,000
Wormwood Scrubs	200
Blackheath	3 0
Nunhead Green	1½
Epping Forest	5,348
Wanstead Park	182
Greenwich Park	200
Dulwich Park	72
Charlton Park	12
Victoria Park Cemetery	11½
Brockwell Park	—
Waterlow Park	30

THE WATER SUPPLY OF THE METROPOLIS.

London is supplied by eight companies, viz., the Kent Waterworks Company, the New River, the East London Water Company, the Southwark and Vauxhall, the West Middlesex, the Grand Junction, the Lambeth, and the Chelsea Company. About 50 per cent. of the total water supply is derived from the Thames, and a few deep springs in the chalk; 38 per cent. is derived from the Lea and chalk springs in the Lea Valley, and the remaining is derived from deep wells in the chalk. Here and there are a few artesian wells; for example, the Langham Hotel, the Inns of Court Hotel, and certain residential flats in the parish of St. Marylebone, pay no water rates, their whole supply being derived from artesian wells sunk on the premises.

The method of purification of the Thames water by subsidence and filtration, as well as the elaborate pumping arrangements, are well worth seeing. The secretaries of the water companies are ever courteous, and members of the Congress will find no difficulty in inspecting the works.

METROPOLITAN SEWERS.

The metropolitan sewers and the disposal of the sewage are both well worthy of study. Application to any of the surveyors of the local boards or vestries may be made to view the old and the modern types of sewers. There will also be special opportunities of inspection of the sewage precipitation works at the northern outfall. The general principle of the metropolitan main drainage system is that of interception. The Thames courses through the City in a valley, and the land covered with buildings, slopes down on each side to the water. Hence the natural fall for drainage is directly into the Thames, and the old system drained direct, making the river excessively foul. In order to remedy this objectionable system huge conduits were designed parallel to the course of the river, "intercepting" the sewage at different points, and conveying it far down the river. The sewage flows partly by gravitation, and where the levels do not allow of this, the sewage is pumped by enormous pumps from a lower to a higher level.[*] The length of the intercepting sewers, including branches, is over thirty-six miles. The sewage intercepted is derived from fifty-one square miles.

DISPOSAL OF DUST.

There are at least three methods of refuse disposal to be studied in the metropolis. There is the old method—the method which in times gone by laid the foundations of more than one contractor's fortune, but which is now only very moderately remunerative. In this method the dust is brought to a wharf on the banks of a canal, the ashes and breeze separated by sifting; bones, crockery ware, metal, paper, rags, animal and vegetable matter, picked out by hand, all being separated and dealt with; manurial matters going by barge down into the country, rags and paper to the paper mills, glass to the glass factory, bones to the artificial manure factories, and so forth. This process may well be seen at the wharf of the Paddington Vestry or at Messrs. Mead and Hobbs' wharfs, Paddington Basin. The most objectionable feature of this method of dust disposal is the employment of hand labour to pick the refuse out. To see women, their hair, clothes, skin, all begrimed with dirt, up to their elbows in unmentionable filth, and breathing a putrid, thick atmosphere, is a most unpleasant sight. The occupation of a dust sorter is essentially degrading, and must be unhealthy.

---

[*] A map of the general drainage of the Metropolis is to be found in "Blyth's Manual of Public Health." (Macmillan, 1890.)

An experimental method of dust disposal is described and illustrated farther on. Special arrangements have been made for members of the Congress to see this method should they choose to do so.

The third method is the cremation of the dust in specially built furnaces called "destructors," such as those of Hampstead, Whitechapel, and Kensington. This method almost entirely does away with the unpleasant operations of sifting, and renders handpicking unnecessary.

The dust is collected from main thoroughfares such as Oxford Street daily. In the City, also, there is a daily collection. In the suburbs and from private houses generally, the dust is collected weekly, but in this matter each authority makes its own arrangements. Some of the vestries, *e.g.*, Hampstead, Paddington, and Kensington do their own "dusting," others employ contractors. The greatest nuisance from collections of dust is from West-end houses, and not from the poorer quarters. The waste of cooks in the better class houses is notorious; after a dinner party jellies, remnants of pastry, soups, and so forth are thrown into the dust-hole, there to putrefy. On the other hand, the poorer classes utilise most things, and burn the rest. The Londoner has always a grievance as to his dust, and invariably abuses the local authorities, but in nine cases out of ten the fault lies with the householder, and a careful impartial inquiry would show that although the dust collection might be improved, it is not, considering the inherent difficulties of the matter, done so badly as is represented.

Common Lodging Houses.

A common lodging house is a house licensed under a special statute, where for a very low charge persons can obtain a bed and facilities for cooking, the beds being let mostly by the night, sometimes by the week. The occupants have dormitories in common. The amount of cubic space per bed is regulated by law. There are about 1,000 common lodging houses in London, accommodating 31,651 persons, under the supervision of the police. The denizens consist of persons who get a precarious living, such as the "sandwich men," low paid trades generally, loafers, begging letter writers, and not a few prostitutes and thieves and vagrants. There are lodging houses for males only and for women only. A few admit "married" couples; these are practically "houses of accommodation." Common lodging houses are to be found in every district in London; they especially abound in St. Giles. They are always accessible. Should a visitor desire to see one, all that he has to do is to ask any of the metropolitan health officers for the address, or, indeed, at the nearest police-station. The visitor can then call and see "the deputy," who will show him round without making any difficulty.

One common lodging house is much the same in arrangement as another. The centre of interest is the common living room. Here will be found, from morning to night, winter and summer, a bright coke fire for the purpose of cooking. Each guest cooks his own food. The deputy has generally a scanty supply of cooking utensils, and this is a constant source of discord. Crockery-ware, knives, forks, spoons are all somewhat deficient, and much use is made of clasp knives and fingers. Pieces of newspaper not uncommonly serve for plates. The bedrooms have no other furniture than the beds and bedsteads. The cubic space per head is not more than 250 cubic feet, and the atmosphere in the morning is anything but sweet. Each man when he goes to bed, puts his clothes and any valuables he may possess under his head; even then, he sometimes gets them stolen.

In the yard there is a row of basins for the purposes of washing, a urinal, and the closet arrangements. It is rare to find a common lodging house dirty; as a rule, the floors, passages, and staircase are scrupulously clean.

Some common lodging houses are of a different class, being connected with religious institutions, or established on a religious foundation. Of this type is the following:—

Gray's Yard Ragged Church.—This is a superior kind of common lodging house, on a religious and, in part, a charitable basis. The entrance for the applicants is in Gray's Yard, but the front entrance is in Duke Street, Manchester Square. The institution is for men only. Any man with fourpence in his pocket is entitled to a bed, breakfast, and a religious service. The beds look something like the bunks in an emigrant ship, being one over the other. The dormitory contains accommodation for sixty. It is ventilated by Tobin's tubes, by special apertures near the ceiling, and by skylight windows. The floor is formed of wooden blocks, set in concrete. Adjacent to the dormitory is a lavatory, with abundance of hot and cold water and soap. On a second floor are various offices and a chapel. Service is held in the chapel every Sunday to a large congregation, the congregation being mostly of the poorest class. The drainage of Gray's Yard is of the most approved type, being of socket pipes embedded in concrete, with manholes, etc. The closets are also well supplied with water from separate flushing boxes, and the whole place is scrupulously clean.

Factories.

Those who visit the Thames Iron Works will be able to see what employers of labour can do for the comfort of their workpeople, but there are also a number of factories in which co-operative effort has had the most beneficial results. Take, for example, the matter of food as managed in the Royal Army Clothing Factory, which is situated in the Grosvenor Road, S.W.; it gives employment to about 1,600 hands, of whom about 1,400 are women. A large proportion of the clothing for the military forces of the country is made on the premises. The general, arrangements are admirable for the ventilation.

lighting, warming, etc., of the vast workroom. The hands need not adopt the system about to be described; they may dine where they choose, outside the factory, should they prefer it, but they are always assured of obtaining, if they care to do so, excellent eatables and drinkables at a very low rate, in a comfortable building set apart specially by the managers, without going outside the factory gates. The balance-sheet of the Tea and Dining Fund shows for the year 1888 a credit balance of £28, besides allowing for a grant to the Provident Fund of no less than £100. The tea account (kept separately from the dinner account) shows that during the year 1888, £1,045 worth of provisions were purchased, including close upon a ton and a-half of tea, three-quarters of a ton of coffee, seven tons of sugar, nearly 28,000 rolls, besides three tons and a-half of bread, nearly 4,000 gallons of milk, and more than a ton and a-half of cake, besides near 4,000 small cakes. The dining account shows purchases to the extent of £908 during the year, including nearly six tons of prime joints, besides two tons of pudding meat, etc., nearly 15 tons of potatoes, nearly a ton of jam and marmalade, three tons and a-half of flour, nearly three tons of bread, and more than a ton and a-half of fish (this latter item is sent direct from Grimsby). 90,960 cups of tea at a halfpenny were sold during the year, as against 155,200 cups at a penny; while the advocates of coffee consumed 92,000 odd halfpenny and but 35,800 penny cups of that beverage. 71,600 slices of bread and butter and cake at a halfpenny per slice were taken, as against 27,500 penny portions. Near 20,000 plates of meat and vegetables at 5d. were partaken of, besides about 5,000 plates at 6d., in addition to some 10,000 of steak pudding and potatoes at 4d. 15,000 penny plates of soup were accounted for, and near 45,000 of pastry, rice, and pudding, so that we have a grand total of 262,250 halfpenny tickets sold, 281,146 penny tickets, some 14,000 at 4d., 20,000 at 5d., and 5,000 at 6d. The dinner tickets are generally purchased in the morning, a man going round with them at a quarter-past nine. There are fixed days for certain joints: roast beef always on Monday, pork always on Wednesday. Soup and sweets, also rice pudding, are ready on every day, so that for 7d. anyone may have a dinner of three courses—soup, meat, and vegetables, and pudding.*

THE METROPOLITAN BATHS AND WASH-HOUSES.

These useful institutions are at the present time to be found in most of the Metropolitan districts. The type that has been the one that has been selected as a type is in the parish of St. Marylebone, and is well described by Mr. R. U. Evens in an account to be published in our next number.

MORTUARIES AND CORONERS' COURTS.

There are only a few really good mortuaries and coroners' courts worthy of imitation. Those of St. Marylebone and St. Pancras are the best, especially the former. The old mortuaries and the post-mortem rooms of not a few districts urgently need reform.

ADMINISTRATION OF THE COUNTY OF LONDON.

By H. DE LA HOOKE, Esq., Clerk to the County Council; SHIRLEY MURPHY, Esq., Medical Officer of Health to the County; and W. J. DIBDIN, Esq., F.C.S., F.I.C., Chemist to the County Council.

FOR the purpose of showing the relations of the London County Council to public health administration it is necessary to make some reference to the system which existed prior to the year 1888, when the Local Government Act was passed constituting London a county and bringing the London County Council into existence.

In 1855 the Metropolitan Board of Works was created, the members being elected by the Common Council of the City, by the vestries of London parishes, and in cases where these parishes were very small, by district boards composed of representatives of two or more vestries whose parishes had been combined into districts. In this Board was vested the main sewers of the metropolis, and certain powers were given it of making bye-laws as to house drainage, as to the width of new roads, the material of which they should be formed, and the plans and levels of sites for building. The Metropolitan Board of Works was also the local authority under the Building Act, and for the purposes of its administration the Board appointed throughout London district surveyors.

Although the Board was not held to be a sanitary authority, it was provided that it should receive a copy of every annual report prepared by the medical officers of health in the metropolis, and by degrees public health duties which could be better administered by a body having jurisdiction over the total metropolitan area were imposed upon it.

The Board was empowered to require the water companies to provide a constant water supply; it became the local authority for regulating slaughter-houses and noxious trades, and under the Contagious Diseases (Animals) Act for regulating cowsheds, for registering milkshops, and for taking measures with the object of preventing the infection of milk with human disease. Its duties under this Act also included the enforcement of measures for preventing contagious diseases of animals, including, for instance, foot-and-mouth disease, rabies, glanders, and farcy and anthrax.

Lastly, the Board was the local authority for putting in force Lord Cross's Act for the improvement of unhealthy areas. It was empowered to elect a medical officer for this purpose, but the appointment was never made, the Board proceeding upon representations made to it by the medical officers of health of the several districts.

In 1889 the Board was replaced by the London County Council, which consists of 118 members elected by the ratepayers, and 19 aldermen elected by the Council itself.

The Local Government Act which constituted the Council conferred upon it all the powers previously exercised by the Metropolitan Board of Works, and, in addition, made it a local authority under the Rivers Pollution Act. The Council is, however, not largely concerned in the prevention of pollution of rivers, for the reason that its powers under this Act do not extend to the Thames and the Lea, for which Conservancy Boards are the local authorities under the Act. Upon these Boards, however, the

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* Annual report for the year ending October 31st, 1889. Chief Inspector of Factories. London, 1890.

Council is represented. The duty of providing for lunatics was transferred to the Council, which now possesses four asylums containing 7,270 beds. One of these institutions is being enlarged and a fifth asylum is being erected. The Council also became the authority for providing for children and young persons requiring to be received into industrial and reformatory schools. The Council now possesses two large institutions for this purpose at Feltham and Mayford.

The future relation of the Council to sanitary administration in London was made evident by its right to appoint a medical officer of health of the county, a right which was exercised soon after the Council itself was constituted, and also by the obligation which was imposed upon it, to pay, when required, one-half of the salary of any medical officer of health appointed by a sanitary authority. An officer to whose salary the Council makes contribution can only be appointed or removed with the sanction of the Local Government Board. Shortly after the Council was appointed the Housing of the Working Classes Act was passed.

This Act provides that any district authority may apply to a magistrate for the closing of any house in a condition so dangerous to health as to be unfit for habitation; and the authority may subsequently order its demolition if it became a nuisance. The authority may also purchase any building which, through obstructing light or air, or by any other means, renders any other house dangerous to health. The proceedings of the authority are reported to the Council, together with any representations to the authority made by a medical officer of health or others; and the Council is empowered, if it should deem it necessary, itself to undertake the work.

Some of the most important provisions of the Act relate to the clearance of unhealthy areas or land covered by houses so ill-arranged or in such unwholesome condition as to be prejudicial to health. If the area be small and the cost small, the sanitary authority undertakes the duty either at its own cost, or with contributions by the Council; if the area is large, the medical officer of health makes a representation to the Council, who may clear it at its own expense, or the Council may itself undertake the clearance of a small area, and require a contribution from the district authority. In case of non-agreement as to the amount of contribution, the Home Secretary acts as arbitrator. The procedure under the Act is that the authority undertaking the scheme makes application to the Home Secretary or Local Government Board, who appoints an officer to hold inquiries into the accuracy of the representation. If the officer report favourably, the scheme is confirmed by Parliament. The land and buildings on it are then purchased by the authority, the buildings demolished, and the land devoted mainly to the erection of suitable dwellings for the working classes.

The Council has recently undertaken a scheme for the improvement of a large area in Bethnal Green, at an estimated cost of £300,000, and proceedings for the improvement of several other areas are in progress.

The Council is empowered under another part of the Act to provide dwellings for the labouring classes. It has decided to exercise this power so far as to erect a model common lodging-house for 320 persons, in this house each lodger will be able to have a separate bed, and enjoy the use of common day rooms, kitchens, etc., at a probable cost of fourpence per night.

The passing of the Public Health (London) Act this year brings the administration of the Council into intimate relation with that of the several sanitary authorities. The Act endeavours to make the administration of the several districts more uniform. Thus the Council is required to make bye-laws for the carriage of offensive matters by road or by water, as to the construction of water closets, earth closets, privies, ashpits, cesspools, and receptacles for dung in connexion with buildings, whether built before or after the passing of the Act, and also as to duties of the occupiers of any premises in connexion with house refuse, so as to facilitate the removal of it by the scavengers of the sanitary authority. These bye-laws are to be enforced by the sanitary authorities. While sanitary authorities are required to provide mortuaries, the provision of proper places for the holding of inquests devolves upon the Council, but the Council may require the sanitary authorities to provide accommodation for post-mortem examinations. It may also extend the provisions of the Notification of Infectious Diseases Act to other infectious diseases than those to which the Act now applies. With a view to ensuring the enforcement of the sanitary law in all parts of London, the Council may, if it is proved to its satisfaction that any sanitary authority has made default in doing its duty under the Act with respect to the removal of any nuisance, the institution of any proceedings or the enforcement of any bye-law, itself undertake this duty at the expense of the authority. The Council may also represent to the Local Government Board any other matter in which the sanitary authority has made default, and the Local Government Board may after inquiry appoint the Council to perform the duty. If the Council is of opinion that the number of sanitary inspectors in any district is insufficient the Local Government Board may order the sanitary authority to appoint the number which is necessary.

The City is still treated exceptionally in some few particulars, but the Act of the present year goes far to weld the districts of London into a united London.

One of the most important powers which the London Council possesses is that of purchasing and maintaining land as park and gardens for the use of the public. This power has been largely exercised by the Council, to the great advantage of the metropolis, and thus scattered throughout its vast area are numerous open spaces, the value of which, in relation to the public health, is obvious. The open spaces recently preserved cover an area of more than 3,100 acres, and the cost of maintenance, salaries, etc., for this purpose is more than £65,000 annually.

The following table shows the acreage and population of the several sanitary districts in London :—

	Acreage.	Inhabited Houses.	Population Census 1891.
City	650	5,750	37 504
Marylebone	1,506	15,354	142,381
Pancras	2,672	24,611	234,437
Lambeth	3,942	38,521	275 202
St. George's, Hanover Sq.	1,119	11 215	78,362
Islington	3,107	38,259	319,433

	Acreage.	Inhabited Houses.	Population Census 1891.
Shoreditch	648	13,932	124,009
Paddington	1,251	14,466	117,838
Bethnal Green	755	17,109	129,134
Newington	631	13,392	115,663
Camberwell	4,450	33,991	235,312
St. James, Westminster	162	2,641	24,993
Clerkenwell	380	7,363	65,885
Chelsea	796	12,195	96 272
Kensington	2,190	22,002	166,321
St. Luke's	239	5,091	42,411
St. George the Martyr	284	7,567	59,712
Bermondsey	627	11,249	84,688
St. George in the East	243	5,451	45,546
St. Martin in the Fields	286	1,467	14,574
Mile End Old Town	679	14,129	107,565
Woolwich	1,126	5,260	40,848
Fulham	1,716	26,906	91,640
Hammersmith	2,287		97,237
Rotherhithe	754	5,226	39,074
Hampstead	2,248	9,528	68,425
Battersea	2,170	20,930	150,458
Whitechapel	378	8,170	74,420
Westminster	815	5,756	55,525
Greenwich	3,427	24,866	165,417
Wandsworth	9,285	25,391	156,931
Hackney	3,935	33,187	229,531
St. Giles	245	4,068	39,778
Holborn	167	3,867	33,503
Strand	167	2,154	25,107
Limehouse	462	7,759	57,599
Poplar	2,335	21,978	166,697
St. Saviour's, Southwark	204	3,624	27,162
Plumstead	10,394	14 545	88,539
Lewisham	6,544	15 898	92,647
St. Olave	125	2,086	12,694
Not included in any sanitary area	61	180	957
	75,462	557,134	4,231,431

The sewage of London is collected, in the first instance, by means of the local sewers, which belong to, and are under the control of the various respective district boards and vestries. From these it is received into the main drainage system of the London County Council, whose main intercepting sewers have a length of over eighty miles, originally costing about four and a half millions sterling. These sewers consist, on the north side of the Thames, of three main intercepting sewers, known as the high, middle, and low level sewers respectively, in addition to numerous collecting branches, and storm relief sewers. These main sewers meet at Abbey Mills, near Stratford, where the low level sewage is pumped up to the same level as the middle and high level sewers, and from thence the three sewers run side by side to the northern outfall at Barking Creek. In like manner the sewage of the south side of the Thames is provided for by means of three large incepting sewers, with their various collecting branches and storm reliefs, and which converge at Deptford, the sewage being carried from thence to Crossness by the main southern outfall sewer. It has been recently recommended by Sir B. Baker and Mr. Binnie, the present engineer of the Council, that an additional intercepting sewer should be constructed from Paddington to Old Ford, and be carried on from thence by another main outfall sewer to the northern outfall at Barking Creek; also that new high and low level sewers should be constructed from Dulwich and Deptford respectively to Crossness. The total cost of these new sewers being estimated at £2,220,000.

Next to the main sewers with their respective pumping stations at Pimlico, Abbey Mills, Deptford and Crossness, as well as other minor ones, the precipitation works at the northern and southern outfalls at Barking Creek and Crossness invite attention. These new works when completed will have cost a further sum of one million sterling, including the cost of the ships, of which six will ultimately be required, only two being now at work, for the carriage of the sludge to sea. At the present time only a portion of the sewage is precipitated by means of lime and sulphate of iron, but when the Crossness works are finished the whole will be submitted to the process. At the northern outfall works the sewage, after receiving the lime and iron, is allowed to settle in the precipitation channels, of which there are thirteen, each 30 ft. wide, and from 860 to 1,210 feet long, the holding capacity being, collectively, twenty millions of gallons. The treated sewage flows through these, the effluent water being run off over a weir, and from thence into the storage tanks, which have a capacity of thirty-five millions of gallons. These were originally employed to ensure the discharge of the sewage into the river, during only the first half of the ebb tide; but they have been insufficient for that purpose for the last fifteen years, and have thus lead to the greater pollution of the river in consequence of the crude sewage overflowing at all times of the tide. It was proposed by the late Metropolitan Board of Works to remedy this about ten years ago, but the work was held back out of consideration for the fact that an agitation was on float to get a Royal Commission to consider the whole question, and it was said that no more money ought to be spent in further works in the meantime. Had that Board been allowed to exercise its discretion the crude sewage would soon have been kept out of the river at low tide, and thus been prevented from being carried up the river, as it has been since that date.

In addition to the treatment by precipitation deodorisation is resorted to, when necessary, by means of permanganate of soda; but this, originally employed as a temporary palliative, will probably not be required when the precipitation works are completed, although it will be a valuable auxilliary if necessary.

The sludge obtained by the precipitation of the sewage is carried out to sea and discharged from ten to twenty miles below the Nore by means of specially constructed steamers, which carry 1,000 tons each. The discharge takes place through valves in the bottom of the vessel, and a thorough intermingling with the sea water is effected by means of the action of the vessel's screws.

The quantity of sewage to be dealt with daily amounts to about 105 millions of gallons on the north side and eighty millions of gallons on the south side of the river. If the total quantity is taken at 156,800,000 for the minimum dry weather flow, each grain of lime or other precipitating material per gallon of sewage will mean ten tons per day, and it necessarily follows that one grain per gallon will give rise to no less than 100 tons of sludge of 90 per cent. moisture (the average composition) to be disposed of each twenty four hours. Hence the necessity for keeping down the quantity of chemicals used as far as possible consistent with efficiency.

The works at Crossness are not expected to come into operation for another twelve months. Those at Barking Creek are practically finished.*

The gas supplied to London by the three large companies, viz., the Gas, Light, and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company, whose united make is over twenty-eight millions of thousands of cubic feet per annum, is tested daily at twenty-three stations, twenty of which are under the control of the Council. In addition to this duty, the Council undertakes the testing of gas meters, petroleum, etc.

An important section of the Council's work in sanitary matters is the prevention, as far as possible, of nuisance caused by the emanations from the main sewers. Various schemes have been tried at different times, such as putting up ventilation shafts, having, in some cases, fires burning in their base, or smaller shafts up the sides of houses. Another scheme which met with no little success, but was discontinued on account of the expense, was that of treating the sewage in the sewers, and thereby preventing the formation and evolution of the objectionable effluvia, and it is not impossible that ultimately it may be found that some such plan is the only practicable solution of the problem. If micro-organisms are the cause of disease—and this appears to be at length admitted—it is undoubtedly desirable to prevent their multiplication as far as possible. Probably this can be best done in the sewers by preventing the putrifaction of the sewage, and ensuring its passage to the place of disposal in an innoxious condition, and so preventing its being a cause of nuisance, if not danger, to those districts through which it may flow during its transit. For these reasons it would seem that the treatment of the sewage in the sewers as early as possible after its admission thereto is the only feasible one.

One of the most important features in the municipal arrangements of London is its Fire Brigade. It is only about a quarter of a century since the extinction of fires, and the saving of life and property in case of fire, have been looked upon as duties properly devolving on the central municipal authority of London. The first legislative enactment, so far as the writer is aware, providing for fire extinction was an Act of the year 1774, the purpose of which was stated to be the better regulation of buildings and party walls, and the more effectual prevention of mischief by fire, within the cities of London and Westminster, and other parishes and places. Under this Act the churchwardens and overseers of every parish were bound to keep a fire-engine for putting out fires in their own parish. These arrangements, however, were found to be so utterly inadequate that the principal fire insurance companies established fire-engines and firemen of their own, and in the year 1832 the companies owning fire-engines united to form a single establishment. This state of things, under which there was a small and fairly well-organised force kept up in the centre of London by the fire insurance companies, whilst each parish kept, or was supposed to keep, its own engine (sometimes popularly and disrespectfully spoken of as "the parish squirt"), continued until the year 1865. In that year an Act of Parliament was passed providing that a single Fire Brigade for London should be formed by the Metropolitan Board of Works, which was then the central governing body, and the Board was by that Act made responsible for the future safety from fire of life and property in London. The fire insurance companies handed over to the Board the plant and material which belonged to them, and undertook, as a condition of being relieved of the responsibility which they had hitherto voluntarily undertaken, but which had become too great for them, to contribute towards the expenses of the new brigade an annual sum equal to £35 per million of the gross amount insured by them in respect of property in London. The Metropolitan Board took up its responsibilities on January 1st, 1866 with the small force handed over by the insurance companies, which formed the nucleus of the strong and well organized establishment which now exists. The first commander of the new force was Captain E. M. Shaw, who, since June 1861, had been in charge of the fire engine establishment kept up by the insurance companies, and who has remained at the head of the fire brigade up to the present time.

The following figures show how great has been the extension of the fire brigade since it was first constituted as a municipal force in January 1866. At that time its strength was as follows:—130 officers and men; 17 fire-engine stations; 2 river stations with floating engines; 9 land steam fire-engines; and 27 hand power engines.

There were at the same time 85 fire-escapes, with about 90 men, maintained by the Royal Society for the Protection of Life from Fire.

The force of men and appliances now composing the Fire Brigade is as follows: 822 officers and men, including coachmen and watermen and men under instruction; 55 fire-engine stations; 52 street stations, with hose-carts, 6 of them having permanent structures; 179 fire-escape stations; 4 river stations; 8 steam tugs; 13 barges, 9 carrying engines and 4 being used as store barges; 9 steam fire-engines on barges; 47 land steam fire-engines; 78 six-inch manual fire-engines; 17 small manual fire-engines; 33 miles of hose; 105 hose-carts and hose-reels; 13 vans for carrying hose and coal; 8 waggons for street-stations; 224 fire-escapes; 10 small fire-escapes kept at police-stations; 9 long fire-ladders, and 9 vans to carry the same: 133 horses.

It will be seen from this how great has been the development of the London Fire Brigade since it was constituted on its present basis in 1866, and it should be mentioned that a great part of this development is due to the London County Council.

When the Fire Brigade Act of 1865 was passed, it was thought that the expense of the Fire Brigade would not be more than about £50,000 a-year. Towards this the Government undertook to give £10,000 a-year, in consideration of the protection of buildings and property belonging to the State; the contribution of the fire insurance companies at the rate previously mentioned produced, in 1865, about £11,000 a-year, and the balance was to be provided by a rate of a halfpenny in the pound, to be levied like other rates, on all the property in London. It was soon found that this income was insufficient and so, whilst the contributions of the Government and fire insurance offices have remained as at first fixed, with this exception, of course, that the fire offices' contribution being a rateable one has increased with the amounts insured by them, so that their annual payment is now about £25,000 a-year, the amount drawn from the ratepayers has increased by leaps and bounds. There is now no fixed limit to their contributions. The London County Council raises every year, as part of the county rate, whatever sum is needed for keeping up the Fire Brigade in a state of efficiency.

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*The cost of the treatment of the sewage by the above method is remarkably low, viz., 27s. 9d. per million gallons, or equal to a rate of about one halfpenny in the pound, or including interest on capital for the cost of the works three farthings in the pound.

The results attained by the London Fire Brigade, as now constituted, with all the most improved machinery, the most highly trained staff of men, and the most perfect means of rapid communication are such, however, as to compensate the inhabitants of London for the increased expense to which they are put. In 1866 the chief officer estimated the relative numbers of serious and slight fires as 25 and 75; the number of fires which he classes as serious has gone on progressively decreasing, until now for some years past he has been able to return the proportion of serious fires as not more than six or seven per cent.

The following table shows the number of fires in London during the last ten years, and the relative proportion of serious and slight losses during each of those years:—

Year.	Number of Fires.			Percentages.	
	Serious.	Slight.	Total.	Serious.	Slight.
1881	167	1,824	1,991	8	92
1882	164	1,762	1,926	9	91
1883	184	1,960	2,144	9	91
1884	194	2,095	2,289	9	91
1885	160	2,110	2,270	7	93
1886	151	1,998	2,149	7	93
1887	175	2,188	2,363	7	93
1888	121	1,867	1,988	6	94
1889	153	2,185	2,338	7	93
1890	153	2,402	2,655	6	94

The number of occasions on which life was seriously endangered by fire during the year 1890 was 154, and the number of occasions on which life was lost was 44 The number of persons seriously endangered by fire was 212, of whom 151 were saved, and 61 lost their lives. Of the 61 lost, 31 were taken out alive, but died afterwards in hospitals or elsewhere, and 30 were suffocated or burned to death.

The quantity of water used for extinguishing fires in London during the year was between 20 and 21 million gallons, or about 92,000 tons. Of this quantity about 40 per cent. was taken from the river, canals, and docks, and the remainder from the street pipes. During the year there have been 6 cases of short supply of water, 4 of late attendance of turncocks, and 8 of no attendance, making altogether 18 cases in which the water arrangements were unsatisfactory.

Wholesale Poisoning from Diseased Meat in Denmark.—115 persons, men and women, partook of the flesh of a cow which had been killed on account of "calving fever." More than half of them were taken ill with griping pains in the stomach, diarrhœa, vomiting, and cramps; others suffered more from headache, dyspnœa, and great prostration. The soup made with the flesh seems to have been especially poisonous. After ten days all recovered.—Nielsen (*Ugeskrift for laeger*, 1890, T. ii, *No. 27.*

THE METROPOLITAN ASYLUMS BOARD:

London's Provision for the Isolation and Treatment of the Infectious Sick.

By T. Duncombe Mann, Esq., Barrister-at-Law, Clerk to the Asylums Board.

The object of the present article is to afford the members of the International Congress of Hygiene and Demography information as to the provision existing in London for the isolation and treatment of persons affected with infectious fevers, diphtheria, or small-pox. The means by which such provision is made in a city 121 square miles in extent, and inhabited by nearly 4,250,000 of persons living in upwards of 500,000 separate dwellings, must naturally be of great interest to all engaged, or interested in the important task of protecting and improving the public health.

The body charged with the duty of providing hospitals and ambulances for the infectious sick of London is called "The Metropolitan Asylums Board." It has been in existence for nearly twenty-four years, having been established under the Poor Law Act, 1867, to provide accommodation for the infectious sick and harmless insane poor; but as regards the infectious sick its powers and duties were in 1889 extended to the provision of accommodation for all infected persons who might desire to avail themselves of the Board's hospitals, irrespective of their social status.

It is not now intended to deal with its duties as regards the insane, nor with the duty (which devolved upon the Board in 1876) of training pauper boys for service in the Royal Navy and mercantile marine. Neither is it proposed to detail the gradual evolution of the Board from its condition as an annex to the various Boards of Guardians, responsible only for the provision of accommodation for paupers afflicted with infectious disease, to its present position of a Board charged with the duty of arranging for the transport and for the isolation in hospitals of the infectious sick, of the whole metropolis, irrespective of their social position. The only subjects dealt with will be those relating to the Board's present constitution and its present duties and responsibilies in so far as they relate to infectious disease.

The Board is composed of 72 members, 54 of whom are elected by the Boards of Guardians of the Poor of the 30 parishes, and unions of parishes, into which the metropolitan district is divided, and the remaining 18 of whom are nominated by the Local Government Board.

At the present time the Board possesses the following accommodation for fever and small-pox patients:

Name of Hospital.	Locality.	No. of Beds.
Fever Beds.		
1. Eastern Hospital	Homerton................	442
2 North-Western Hospital	Hampstead	443
3 Western Hospital.........	Fulham.....................	224
4. South-Western Hospital	Stockwell..................	340
5 South-Eastern Hospital	Deptford	462
6. Northern Hospital	Winchmore Hill	480
Small-pox Beds.		
7. Hospital Ships, "Atlas" and "Castalia"	Long Reach, River Thames..................	350
8. Gore Farm Hospital......	Darenth, near Dartford	800
	Total......	3 541

Note.—No. 6 is for convalescent fever patients, and No. 8 for convalescent small-pox patients.

Each of the foregoing establishments is under the charge of a medical superintendent, who is responsible for the welfare of the inmates, and the general administration of the institution, subject to the control of a committee of twelve members appointed by the Board.

For the transport of patients to and from the above-mentioned establishments the Board has provided a land and a river ambulance service. The land service consists of three ambulance stations adjoining the Eastern, Western, and South-Eastern Hospitals respectively, but administratively entirely independent of those establishments. The accommodation for staff, horses, vehicles, etc., is as under.—

	Eastern Station.	Western Station.	South Eastern Station.
For Male Staff	22	15	20
For Female Staff, including Nurses	14	11	12
For Horses	16	15	20
For Vehicles	*30	13	*25

The river service consists of three wharves, with piers and floating dummies for the embarkation and disembarkation of patients, three specially constructed ambulance steamboats for the conveyance of patients to and from the floating hospitals at Long Reach, and a steam pinnace for the use of the staff.

The wharves are situated: One called the West Wharf, on the north bank of the river Thames, near Wandsworth Bridge; one, called the South Wharf, on the south bank at Rotherhithe, near the Commercial Docks Pier; and the third, called the North Wharf, on the north bank at Blackwall, near the East India Docks. Each wharf is in charge of a Piermaster, with one or more assistants as may be required. The crews of the steamboats reside in houses belonging to the Board adjoining the South Wharf. The whole river service is under the charge of a Superintendent.

The accommodation for patients on the three ambulance steamboats enables them to carry altogether over one hundred acute cases of small-pox at one time.

Telephonic communication is established between the Chief Office, Norfolk Street, Strand, and the ambulance stations, wharves, and hospitals.

The means to be adopted for procuring the removal and admission of patients to the Board's hospitals have been reduced to a condition of perfect simplicity. Immediately a medical practitioner finds that a person is suffering from fever, diphtheria, or small-pox, he writes out a certificate to that effect. A telephonic or telegraphic message is then dispatched by him or by the patient's friends, if between eight a.m. and eight p.m. on week days, to the Chief Office; or if between eight p.m and eight a.m., or on Sundays, to the nearest ambulance station. The message must contain the name, age, and full address of the patient, the description of the disease from which he suffers, and the name of the applicant. Immediately upon the receipt of the message at the Chief Office, it is transmitted by telephone to the proper ambulance station, and within five minutes an ambulance with nurse, driver, and, if the patient be over ten years of age, also a male attendant will be on its way for the patient. If it be a fever or diphtheria case it is at once conveyed to the nearest hospital receiving such cases. A small-pox case is conveyed to one of the Board's hospitals for examination by the medical superintendent, and upon his confirming the diagnosis the patient (if in a fit condition to bear the journey) is removed to one of the wharves, placed on board the ambulance steamboat, and conveyed to the hospital ships. If the diagnosis is not confirmed, and the patient is not suffering from any other disease treated in the Board's hospitals, he is at once sent in the ambulance to the place from whence removed. These are the arrangements in non-epidemic times. In times when small-pox is prevalent the patients are removed direct to one of the wharves, and are there examined by specially engaged officers.

All the necessary directions for the removal of patients from their homes to the hospitals, for the transfer of patients from one hospital to another, and for the conveyance of recovered patients from the hospitals to their homes or other places, are given by the Clerk to the Board, subject to the control of the Ambulance Committee appointed by the Board to regulate all these matters.

The Board is also empowered to remove in its ambulances persons suffering from any dangerous infectious disorder to other places than the Board's hospitals. The procedure for effecting such removals is precisely the same as in the case of patients removed to the Board's hospitals, except that when the application is made the address to which the patient is to be conveyed must be stated. The charge for removal to any place within the metropolitan district is 5s., and 2s. 6d. extra for a nurse, if required. The ambulances may be sent outside the metropolitan district in special circumstances, at an extra charge of 1s. for each mile outside. Every ambulance is on all occasions thoroughly disinfected on its return to the ambulance station.

Up to the end of 1890 no fewer than 113,211 patients had been treated in the Board's hospitals, 55.204 of whom were admitted as fever cases, and 58,007 as small-pox cases.

Since the establishment in East London of the land ambulance service in 1881 (extended to the whole of the metropolis in 1884), 49,129 fever and small-pox patients have been removed from their homes to the various hospitals, and 13,036 recovered patients have been removed from the hospitals to their homes. From 1884 to the end of 1890, 4,864 small-pox patients had been transferred from the London hospitals to the Board's wharves on the river Thames, *en route* for the hospital ships at Long Reach. Further, since September, 1887, 9,487 convalescing fever patients have been transferred from the London hospitals to, principally, the Northern Hospital, and 8.254 recovered patients have been brought back to London from that hospital, and during 1890, 309 were brought back from the Gore Farm Hospital at Darenth. From near the end of 1839 to the close of 1890, 129 patients were conveyed to other places than the Board's hospitals. In all, 85,209 removals have been effected since the establishment of this service.

The river ambulance service was not established until the outbreak of the last small-pox epidemic in

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[*] Part of the accommodation for vehicles at the Eastern and South-Eastern Stations can, on emergency, be utilised as stabling for 16 and 20 horses respectively.

February, 1884. From that date until the end of 1890 the ambulance steamboats have carried 11,337 small-pox patients to the hospital ships, and have brought back 10,358 recovered patients.

The total removals effected by the land and river ambulances number 106,904, without including the conveyance of visitors to patients, staff, etc.

These removals have been carried out in all weathers and throughout all seasons of the year, and to a great extent during the night, without detriment to the patients, and without serious accident or mishap to any person.

It may reasonably be claimed that the provision of so complete an organization for the rapid removal and isolation of infectious cases has had some appreciable effect on the mortality from the diseases treated; and that such is the case appears from the Registrar-General's returns. In the year 1870, prior to the opening of the Board's hospitals, the annual mortality per 1,000 persons living from scarlet, typhus, and enteric fevers was 1·88, 0·15, and 0·30 respectively. Since that year there has been a gradual and almost uninterrupted decline in the mortality rates from each of those diseases until in 1890 they had fallen to 0·19 (scarlet), 0·00 (typhus), and 0.14 (enteric).

With respect to small-pox, however, the Board's action did not appear to have so beneficial an effect until after the year 1884, when the floating hospitals at Long Reach were established. The wisdom of the course then taken is unmistakeably proved by the results. In 1881-2-3-4-5 the annual mortality from small-pox per 1,000 persons living was 0·62, 0·11, 0·03, 0·31, and 0·35 respectively, while for the years 1886-7-8 and 1890 it has stood at 0·01, 0·00, 0·00, and 0·00. There was no death whatever from the disease in 1889.

Satisfactory as these results must be to the Board and all interested in the public health of London, yet it is possible that far better results might be secured if certain anomalies in the sanitary arrangements of the metropolis could be removed. It may be claimed for the Asylums Board that its ambulance and hospital organizations are as nearly perfect as it is possible to make them—that they are indeed what an enthusiastic visitor from beyond the "silver streak" termed them "the realization of a dream of perfection"; but if the means taken by the various local sanitary authorities—the vestries and district boards—fall short of what are necessary for the effectual disinfection of the premises from which the patients are removed, and of the bedding, clothing, &c., which they leave there, then very much of the benefit derivable from the isolation of infectious persons is lost, and there is reason to fear that in some instances this is the case. A closer connection between the ambulance authority and the authority charged with the duties of disinfection, &c., would be of advantage in completing the scheme for dealing with infectious disease in London, and it is to be hoped that, in the future, arrangements may be made to this end, so that the valuable information obtainable from the patients or their friends as to the probable origin of the patients' infection may be utilized in some systematic way towards the stamping out of preventable infectious diseases.

THE CITY OF LONDON.

There are a number of matters to be seen in the City of London of considerable interest to the sanitary expert. Four are specially important, viz.:—

(1) The City Mortuary Buildings.
(2) The Condemned Meat Shed.
(3) Artizans' Dwellings.
(4) The Destructor.

I.—The Coroner's Court.

A compact block of buildings, which includes the keeper's lodge, the mortuary chapel, an unconsecrated building used for the reception of bodies; the Coroner's Court, post-mortem-room, and chemical laboratory. In connection with the last-named there is an unpretending but interesting nucleus of a museum. In the collection is a photograph of the writing found on one of the blocks of artizans' dwellings: "I am going to do one on the 27th;" signed, Jack the Ripper. Here also may be seen such objects of interest as have accumulated from the daily routine work of the sanitary department, such as old-fashioned lead D traps, riddled with holes from the action of the gases of decomposition; sections of pipes blocked by incrustations of calcium carbonate and in various other ways; specimens of holes gnawed by rats in lead water-pipes; large photograph of the horse ambulance, which may be used for the conveyance of any citizen, without payment; and also of the hand hearse used for the conveyance of bodies to the mortuary, both of these vehicles being kept on the premises. One side of the block of buildings is occupied by a furnace or refuse destructor and a disinfecting chamber, built by Leoni, which has been in constant use for the past twenty-one years. It is constructed to act with either dry or moist heat, or both. Articles, before being treated by heat, are passed through a sulphur chamber.

II.—The Condemned Meat Shed.

The condemned meat shed at Smithfield Market contains three large slate tanks in which the condemned putrid meat is treated by immersion in a chemical solution or bath, which disinfects and deodorizes the meat seized before it is taken to the factory of the contractor, a bone boiler and fat melter, at Bow. It also renders the meat so uninviting to the sight, and so permanently nauseous to the taste, that all possibility of tampering with it for fraudulent purposes is prevented. The following is the formula for the disinfecting bath:—

Chloride of calcium	2 cwts.
Chloride of sodium	½ cwt.
Proto sulphate of iron	1 cwt.
Carbazotic acid	2 lbs.
Water 300 gallons.	

Large quantities of putrid meat, owing to the breakdown of some of the refrigerating apparatus used in the market, have frequently to be dealt with. The only precaution needed is to cover the meat with the fluid, and with game and lighter articles it is found necessary to keep them beneath the surface by a heavy iron grating. It is not found that the materials employed deteriorate the fat for the only legitimate purposes for which it should be used, namely, by candle-makers, soap-makers, perfumers, and manufacturers of various sorts of lubricants. The meat after treatment is conveyed to the contractor in specially constructed tank carts.

III.—Artizans' Dwellings.

The blocks of buildings, five in number, named respectively North, Princes, Queen's, King's, and South block, are situated in the Ward of Portsoken, on land bounded on the north-west by Harrow Alley, on the south-east by yards in the rear of houses in New Street, on the north-east by houses in Middlesex Street, and on the south-west by a street called Artizans Street. The total cost of the houses was £201,415. They have been carefully built, and the sanitary arrangements have received great attention. The foundations are formed in concrete of blue lias lime and clean ballast. A damp course is carried through the walls of all the buildings just above the ground level. The private yards or areas between and surrounding the blocks are formed of concrete coated with asphalte. The entire area occupied by and surrounding the dwellings has, therefore, an impervious surface. The sewerage and drainage has been well looked after. The floors throughout the building are fireproof. Each floor may, therefore, be considered almost as a separate fireproof dwelling divided into separate tenements containing one, two, or three rooms. The three-room tenements are arranged as a living-room and two bed-rooms, the two-room tenements as a living-room and one bed-room, and the one-room tenements as a living-room and bed-room combined. The total number of three-roomed tenements in the fine block is 43, of two-room tenements 174, and one-room tenements 24, making a total number of 241. There are also a few shops on the ground floor. Each living room has a cooking range. All the stoves and ranges have cast iron mantles and shelves. There is a cupboard in each living-room fitted with shelves to serve as a pantry; these cupboards are ventilated by openings covered with perforated zinc placed in the external walls. Beneath the cupboards coal bunks are formed. All the sleeping rooms have open fireplaces. The keys of all the door locks vary. The dust and ashes on each floor are disposed of by shoots which terminate in receptacles either in the basements or in external dustbins slightly below the level of the yards, so constructed that they are readily accessible to the dustman. The mouths of the shoots in the buildings are on the landing of the stairs or in the sculleries. There are two water closets on each floor to each subdivision, or about one water closet to every four rooms. The apparatus used is known as the Lambeth flush-out closet pan, fitted with water waste preventers under the seats. The seat is in white deal, hinged to lift up to enable the slop sink to be used conveniently without wetting the seat. The roofs of the houses are flat, and are used by the tenants for drying clothes. The water supply is a constant one, and all the taps are screw down high pressure taps.

The general style of the buildings is somewhat Jacobean in character, and was selected as lending itself readily to the necessities of the openings, and giving a cheerful appearance at a moderate cost. The shops and tenements let at the following rents, the Commission paying all rates and taxes: Shop, with two rooms and basement, 28s. to 30s. per week; shop, with one room and basement, 23s. per week; three-room tenements, 9s. per week; two-room tenements, 7s. to 7s. 6d.; one-room tenements, 4s. per week. The gross estimated rental is about £6,000 per annum.

IV.—Destructor for the Cremation of Refuse at Lett's Wharf, Lambeth.

This is one of the well-known refuse destructors made by Fryer, of Nottingham. Owing to the value of land in London, and the difficulty of securing sufficient space, the usual inclined plane leading to the top of the cells has been replaced by an elevator. The carts are constructed to lift off the wheels, and are raised by the elevator to the top of the flat platform and shot directly over the opening to the cells. It having been found impossible to deal with the whole of the refuse by the use of the destructor, a portion has, to the regret of the medical officer, to be treated by the old unsatisfactory method of hand sifting.

PORT OF LONDON SANITARY AUTHORITY.

By Dr. Collingridge, Medical Officer of Health for the Port.

The Corporation of London, by the Public Health Act, 1872, was constituted the Sanitary Authority for the Port of London, and pays all the expenses incident upon this duty out of its corporate funds, no expense falling upon shipping or the general public.

The Port for this purpose extends from Teddington Lock to an imaginery line drawn from Havengore Creek in Essex to Maiden Point on the Island of Sheppey, thus embracing the Mouth of Medway and including all docks, rivers, streams, creeks, and islands within these limits. The actual extent of the Port is, therefore, about eighty miles in length and about seven miles at its widest part.

The Docks cover an area of about 600 acres, those on the north side of the river being the London, St. Katherine's, Regent's, Millwall, East, West, and South-West India, Victoria, Royal Albert, and Tilbury, with the Surrey and Commercial Docks on the south shore.

The principal duties of the Authority is the control of quarantine or medical inspection; the isolation of disease, with the subsequent fumigation; the sanitary inspection of the district, especially the docks, with a view to the abatement of nuisances injurious to health; the routine inspection of vessels to prevent overcrowding, and to insist upon proper lighting, ventilation, heating, sanitary arrangements, and water supply; the inspection of food, mainly frozen, chilled, and tinned meats, fruit, and vegetables; the prevention of importation of clothing of persons who have died from infectious disease without proper treatment; the registration and inspection of canal boats. The Notification of Infectious Diseases Act has been adopted by the Authority, and measles added to the list.

The average number of vessels entering and leaving London is about 25,000, with a capacity of nearly nine millions of tons.

The control of this sanitary district is in the hands of a medical officer stationed in the upper part of the district, and an assistant medical officer at Gravesend, the boarding station at the entrance of the Port. Here, also, is an infectious disease hospital for the reception of cases imported by shipping, or occurring on vessels while lying within the district.

The whole Port is mapped out into districts, each of which is allotted to an Inspector, whose duty it is to visit his part daily, and inspect every vessel which has arrived since his last tour.

This is in addition to the boarding of the vessel on arrival. The upper part of the Port is daily visited by means of a steam launch, which is specially constructed so as to serve as an ambulance.

A few figures will best show the extent and nature of this inspection. In one year 24,000 inspections were made of vessels.

Thirty-six vessels were fumigated, while 400 structural alterations for hygienic improvement were ordered.

The principal attractions for visitors in the Port are the numerous training ships, which are at all times open to inspection; the magnificent docks, especially the Royal Albert, and Tilbury for steamers, and the India Docks for sailing ships.

The hospital of the Port Sanitary Authority at Gravesend, and the branch hospital of the Seamen's Hospital Society, in the Royal Albert Docks, are worthy of a visit, the latter especially as being within an easy distance of London.

The Medical Officer of Health will, as far as possible, be glad to facilitate the inspection of any point of interest in the Port.

THE DRAINAGE AND SEWERAGE OF THE HOUSES OF PARLIAMENT, WESTMINSTER.

THE ventilation of the House of Commons has recently been the subject of inquiry by a Select Committee. The Committee has issued a report upon the subject, recommending certain improvements in detail. The peculiar system of ventilation with the method of filtering the air is described in PUBLIC HEALTH, Vol. III., No. 16, 1891.

The Select Committee also report on the drainage of the Houses of Parliament, and state that the present system* was established in pursuance of a report of a Select Committee in 1886, and that it works satisfactorily. The connection between the Houses of Parliament sewers and the metropolitan low level sewer is so constructed that no backwater or return of sewage, or of sewer gases from the metropolitan sewer, can enter those of the Houses of Parliament. The Committee, indeed, consider the drainage perfect. At the same time they find fault with the drainage of Westminster lying immediately outside the Houses of Parliament, and think that the County Council ought to improve it, but they decidedly disapprove of the suggestion that has been made to run a ventilator up the clock tower.

Messrs. Shone and Ault, C.E., of Great George Street Chambers, have the kindness to state that on application they will go through the necessary forms for permission to view the sewer system of the Houses of Parliament, and send some competent person or persons to conduct the party or parties over the works.

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* The system is the Shone Hydro-pneumatic System, and is described in a small work by Dr. Isaac Shone.

THE ST. MARYLEBONE MORTUARY, PADDINGTON STREET, W.

THESE buildings face the old St. Marylebone Burial Ground, now converted into a pleasant flower garden; they are approached by a private roadway from Paddington Street through a Gothic gateway. They were designed by Messrs. H. Saxon Snell and Co., and were formally opened by the Lord Bishop of London on November 28th, 1888.

The buildings are arranged in three distinct blocks separated from one another by paved roadways. On the south side is the Public Mortuary, the internal walls of which are lined with light glazed tiling their whole height, the floor is tiled, and the windows filled with tinted glazed lights. The east end of this room is divided off by a pointed archway, and is available for use as a mortuary chapel for conducting funeral services.

On the north side are contained in one block a post-mortem room and coffin store, also an inquest mortuary, and, separated from it by a large glazed partition, a lobby for the convenience of jurors viewing the bodies. The arrangements in these two departments are very similar (although not on so large a scale) to the celebrated Morgue in Paris.

With the exception of the coffin store these rooms are lined with high dadoes of white glazed bricks or tiles, and are amply lighted by windows and roof lanterns. The revolving post-mortem table has been specially designed for the building on improved principles.

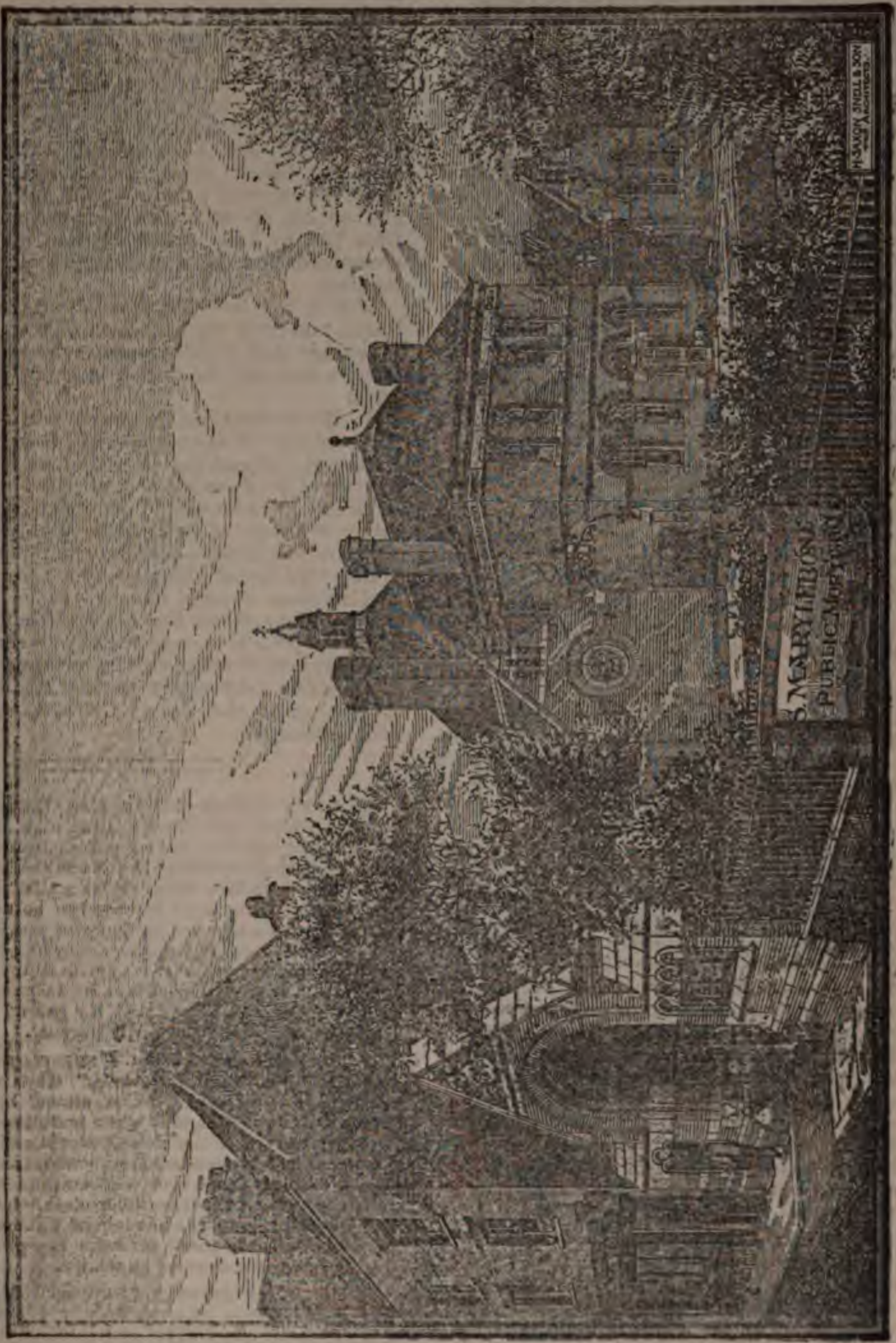
The central block, which is two storeys in height, contains on the ground floor the caretaker's living room and office, also a waiting-room for the accommodation of witnesses, or for the jury when in consultation.

The upper floor (approached by a stone staircase) contains the Coroner's Court, Coroner's private room, and caretaker's rooms.

The Court Room is warmed in winter by a large open fire and hot-water coils. The fittings are of pitch pine, varnished.

Members of the Congress may view the mortuary at all reasonable hours.

THE HOUSING OF THE PEASANTS IN CORUNNA.—The land is subdivided into small tenements, the peasant leaseholders and annual rateholders are altogether too poor to improve their soil, and even if they were not are sadly too ignorant and conservative in the adoption of primitive customs to think of using any new system of implements in farming. They might be well likened to the small class of peasant farmers in many parts of Ireland. Their cottages are mere hovels with a stone stoop or fireplace with a hole in the roof for the smoke to ascend through; their cattle, which generally consists of a pair of oxen fattening for the export trade to England, are under the same roof as the family, and generally receive more solicitude from the heads thereof than their children; pigs and fowls are stumbled over in these dark cabins. The female portion of the community, if they are not engaged working in the fields or household duties, are occupied in spinning, or at the shuttle, making the coarse linen for family use. Their food consists chiefly of maize bread, called "Broma," and a vegetable soup, made from greens, bacon fat, potatoes, beans, etc., all boiled together. Tea and coffee are unknown except in the houses of the rich, and meat is a luxury only enjoyed on high days and festivals.—*Consular Report on the Trade of Corunna.*


S. MARYLEBONE
PUBLIC M
H. SAXON SNELL & SON ARCHITECTS

OBJECTS OF INTEREST TO A SANITARIAN IN THE BOROUGH OF ST. MARYLEBONE.

By A. Wynter Blyth, Medical Officer of Health.

St. Marylebone has for its southern boundary Oxford Street, from Tottenham Court Road to the Marble Arch; north it is bounded by an irregular line running across Primrose Hill; westwards to Maida Vale; east, by Cleveland Street; and west by the Edgware Road. It contains the Edgware Road, the Baker Street, the Portland Road, the St. John's Wood Road, and Marlborough Road Stations, so that, with addition of the great lines of omnibus traffic, anything worth seeing can with rapidity and facility be visited by the members of the Congress. St. Marylebone contains all kinds of property, from palatial residences down to crowded tenements in which reside the very poor. It, therefore, is admirably adapted for the purposes of illustrating ways of living in the metropolis, and of different kinds of structure. According to the recent census, it contains 142,381 living in 15,354 houses; the total area is 1,506 acres.

The chief objects of interest are the Samaritan, Queen Charlotte, and the Middlesex Hospitals. One of these is described separately in the present number (see page 17). The Mortuary and Coroner's Court is a model building (see page 13). The Workhouse, in the St. Marylebone Road, is more a good example of judicious management than of structure, but the Guardians have resolved to rebuild the front, and in a very little time the workhouse will add considerably to the architectural beauties of the borough.

The Court House stands in St. Marylebone Lane, and here all the sanitary and local government business of the parish is transacted. The Court House has much historical interest, but it is ill adapted for the wants of the present day, and the writer expresses a hope that ere long it will be pulled down, entirely reconstructed, lit by the electric light, and joined on to the general telephone system. The baths and washhouses have been of recent years considerably improved; they are situated near the Edgware Road Station in the Marylebone Road, and are well worth a visit.

The sewers of the parish consist of over thirty miles of old Westminster sewers, about twenty miles and a-half of new egg shaped sewers, and about three miles of brick-barrel sewers. A large sum of money has recently been borrowed for the purpose of improving these sewers, and every year the Sewers' Committee, on the recommendation of the Surveyor (Mr. Tomkins), lay down new sewers in place of old, abolish dead ends, fix flushing tanks, and new ventilators.

I am beginning to be proud of the St. Marylebone house drainage, a matter ten years ago the reverse of satisfactory; whole streets are now drained according to some model regulations drawn up by the Sanitary Committee, and in the poorest neighbourhoods can be shown most excellent examples of drains laid in concrete, with man-holes, intercepting chambers, and proper air-inlets and ventilators, which have taken the place of old defective brick drains.

The water supply is mostly from the Middlesex Water Company, in part from the Grand Junction Company. Within twelve months from now the service will be all constant, for the constant service is being gradually extended from the southern to the northern portion.

Since 1886 there have been thirteen large blocks of artisans' dwellings erected mostly in place of inferior property, some of which had been condemned under the Artisans and Labourers' Dwellings Acts. At present 1,000 families, or 3,248 souls, live in these buildings. The Portman Buildings in Lisson Grove are about the best examples. Single rooms are here to be had at the low rent of 2s. 6d. to 2s. 9d. per week; two rooms at from 4s. to 5s. 6d. and so on, up to a few four-roomed lettings at from 13s. to 14s. An innovation in structure or accommodation is a full-length bath on each landing.

Within the last few years, from the falling in of leases, and from the operation of the Artisans and Dwellings Act, much insanitary property has been swept away, and the parish is being practically rebuilt.

St. Marylebone has, in proportion to its area, a large amount of open space, *e.g.*, Regent's Park, the Paddington Street burial ground, and the beautiful district of St. John's Wood, with its large proportion of isolated residences. This charming suburb was lately in danger of being marred in part by a projected new railway—a danger happily averted. It is now threatened with a greater, because concealed and insidious danger, namely, the building over of back gardens, which the defective buildings acts of the metropolis give every facility to accomplish.

Foreigners or other visitors wishing to inspect St. Marylebone may apply to the Medical Officer of Health, or to the Vestry Clerk, Court House, St. Marylebone, W.

Holman's Patent Sewer Gas Destructors. — Sir Douglas Galton and Messrs. Burt and Engelbach have made a joint report in reference to their arbitration re the Richmond Main Sewerage Board and the Thames Conservators, in which they state "We are all of opinion that the Sewage Gas Destructors intended to be used as ventilators will be effective for the purpose proposed, and that they will not cause nuisance or annoyance to the occupiers of the adjoining houses or to persons on the Towing Path; but we think that they should be inspected frequently, and care taken to ensure that the gas at the base of the lamp column is kept constantly burning.

Lahmann's Cotton Wool Underclothing. — This is very similar to "Cellular cloth." It is cheap, durable and does not shrink. It is stated by Sir Sydney Waterlow that he found it warm and pleasant to the skin in a long journey in the United States and Canada, while the patentee has abundant testimonials from hot countries to prove that it is the coolest substance for tropical wear. It is a fact that flannel, cellular cloth, the "cotton wool underclothing," and the like fabrics which enclose in their interstices abundance of air have the property of being cool in summer and warm in winter.

A New Adulterant for Saffron.—M. Collardot has detected (*L'Union Pharm.*, July, p. 294) the presence of fine shreds of onions dried and coloured artificially, and also the powder of "sweet cayenne," or paprika, made adherent to the styles by some agglutinating agent, which he believes to be honey. The second adulterant he found to the extent of 60 or 70 per cent., or in some samples even more.

THE GENERAL STRUCTURE AND SANITARY ARRANGEMENTS OF GUY'S HOSPITAL.

By Dr. STEELE, Superintendent of the Hospital.

GUY'S HOSPITAL, situated in Southwark, not far from the south end of London Bridge, covers, with its detached buildings and airing ground, an area of rather more than six acres. It contains a night population of over 600, which is more than doubled during the day by the influx of students and out-patients. The ancient part of the hospital, built in 1724, consists of two squares, with accommodation for nearly 300 persons, and is the only building in the country which has been for so long a period continuously occupied with sick people. Many years after its erection wings, right and left, were added to the squares, and formed the large entrance quadrangle which is open to the public street. These were intended for the resident officers, governors' court-room, and the chapel, which occupies the central portion of one wing. In the vaults underneath the chapel are deposited the remains of the founder, of Sir Astley Cooper, and of other benefactors, and in the chapel itself there is a very fine monument by Bacon of Guy, who is represented in civic costume pointing out to a poor invalid the asylum he had founded for her relief. Some ornamental sculpture, also by Bacon, was afterwards added to the façade of the building, and consists of figures of Esculapius and Hygeia, and some bas-reliefs which are intended, among other things, to show the prevailing practice of the time with regard to blood-letting. The patients occupy twelve wards, six in each square, the ground floors being reserved for accidents, of which there is always a large number in the hospital. The wards average from ten to twelve feet in height, and are shaped somewhat after the form of the letter L, the shorter line occupying the distant end of each. The windows, which at first must have been sufficiently numerous, have been reduced in number by the additional buildings afterwards added. From the first these were constructed on a principle of allowing free ventilation without draughts—the puzzle of modern sanitarians. They are not suspended in sash frames, like ordinary windows, but are divided in the transverse centre into two parts, the upper half moving outwards and inwards by means of a fixed lever rod, while two of the upper panes in each window, detached in part from the frame work, combine to form a kind of hopper, with its mouth continually open and directed upwards to the ceiling. These ventilators are open night and day, summer and winter, and it is doubtful whether any modern artifice would improve their utility. The old part of the hospital to which these remarks refer is used entirely for the reception of surgical cases, and possibly on this account no attempt has been made to supplement the heat from the fire-places by other methods of warming.

The medical building is of more recent date, having been erected about 1854, and consists of six double wards, which accommodate from forty to fifty patients in each. It is specially designed to admit of a system of warming and ventilation different from most hospitals in this country, and which was designed by the late Mr. Sylvester, whose system of ventilation has been largely adopted in convict prisons. By his arrangement, the fresh air from a high atmospheric level is introduced into the wards and other apartments by means of a couple of towers, one for each wing, through which it descends to the basement, where it enters what may be termed fresh-air chambers, extending on either side the entire length of the building. Further than by its own specific gravity, and in winter by a certain suction power induced by having to pass over a series of hot-water pipes in the basement, there is no mechanical force employed to facilitate the descent of the incoming air. Having reached the warm air chambers, the fresh air now ascends by a series of separate and independent flues into the various wards, entering these through gratings, which are placed in one wing close to the ceilings, and in the other on the floor level. The vitiated or used air of the wards makes its escape through a corresponding series of flues in the walls, which in one portion of the building are open near the level of the floor, and in the wing more recently erected through a series of openings in iron girders, crossing the ceilings and communicating directly with upright channels in the walls. The ascending air then passes into a vitiated air chamber, which extends horizontally under the roof, throughout the entire length of each wing, and the currents, meeting in the centre, are carried upwards through a tall tower, which also emits the smoke from the various fireplaces throughout the building. Here, again, there is no extraction force employed, further than hot-water pipes, which circulate round the smoke channel which latter passes through the centre of the vitiated air chambers, and ultimately through the open tower. The ventilating and warming apparatus works more effectively during the winter months, when the windows are for the most part closed, as is usually the case with most systems in which much mechanical ingenuity has been expended to surmount atmospheric vicissitudes.

The two buildings already described communicate by a subway, used occasionally in wet weather, but in every other respect they are totally distinct. In addition to these, there is a third building entirely isolated, constructed originally for lunatics, and which forms an excellent example of how a building intended for a totally different object can be utilized for the sick. The remodelling was effected by removing the walls of the cells, extending the loop-holed grated windows to the floor level, and planting fire-places back to back in the centre of each of the two galleries, which now form two of the most cheerful looking wards in London. Being constructed on the one floor pavilion principle, aided by a lantern roof, and containing numerous sanitary adjuncts, the clinical wards meet the requirements of the most advanced systems of hospital construction. It may be mentioned, however, that being intended for medical patients, the central fire-places were found insufficient of themselves to maintain an agreeable temperature in very cold weather, and it has been found necessary to supplement their warmth by means of steam pipes, which pass round the wards under the beds.

Dangers to be apprehended from the spread of infection, now greatly reduced in all Metropolitan hospitals by the action of the Metropolitan Asylums Board, have been met in various ways. Infected linen, bed clothes, bedding, and wearing apparel of patients who have been affected with erysipelas, fevers, or diphtheria, are exposed to a dry heat in a close chamber fitted with trestles and a perforated iron bottom, through which the hot air ascends from a closed furnace underneath. Since the heat is carefully regulated, and never allowed to exceed a temperature over 230 Fah., no accidents have occurred from clothes taking fire. The stuffing of beds and mattresses, which consists mainly of flock and wool, is treated in a different way. These materials require periodical cleansing and dressing, and occasionally disinfection; and with the combined objects, an apparatus consisting of a hollow iron cylinder, with a double casing for heating by steam, is fixed in the flock-room. The interior of the cylinder is fitted with projecting prongs to tear up the masses of flock and wool which may be placed in it, and it revolves by the action of the steam engine which works the laundry apparatus. The machine, which is much the same as that known as "a devil" in cloth factories, is also furnished with an opening in the centre, through which dust and effluvia from the flock are carried into the smoke shaft of the adjacent steam boilers. Placed outside and inside of the laundry are slate tanks, in which the bed and other linen fouled by the excretions are steeped in a solution of coarse carbolic acid prior to undergoing the ordinary washing and rinsing.

With regard to the removal and destruction of waste material, it may be remarked that the dust-bin contents are emptied daily and twice on Saturdays, but as the local authorities in their jurisdiction refuse to deal with all other kinds of refuse, it is disposed of by incineration. The débris, which is mainly composed of vegetable refuse, faded flowers (of which in all hospitals there is now an increasing abundance), poultices, cast-off dressings, etc., are burnt up in the furnaces of the steam boilers. Their slow combustion no doubt hampers the engineer in his efforts to obtain a sufficient supply of steam, and it has often been suggested that a separate crematorium might be erected for the purpose, but it is also possible, with a re-arrangement of the present furnaces, to avoid this alternative. The only other destructor remaining for notice is the vermin killer, which every establishment should possess in some form, if it is in the habit of receiving dirty people. An oven for the purpose was constructed many years ago by Leoni, the gas engineer, where the heat is generated by a circular string of Bunsen burners in a chamber fitted with iron trestles and furnished with a double casing, the interior of which is well packed with asbestos or slag-wool. The arrangement is both convenient and expeditious, and when carefully regulated and supervised the oven is an excellent germicide; but it has occasionally happened, either from neglect or possibly from the inflammatory character of worn-out clothing, that the fabric gets scorched and even burnt up.

Like other hospitals built in the presanitary period, the drainage arrangements of the buildings have undergone material alterations and improvements from time to time, so as to bring them up to the sanitary requirements of the day. In some respects the old hospital has the advantage of the more modern building, inasmuch as the old brick *drains* which had done duty for more than a century and a-half were replaced about twenty years since by earthenware pipes of somewhat larger calibre than would now be thought necessary, but quite efficient for the purpose intended. Not long after this all the sanitary adjuncts to the drains and the fittings inside the wards of the east inner square were renewed and ventilated on the Banner principle, at that time much in vogue. Still more recently the sanitary arrangements of the wards in the west inner square have undergone even a more important transformation. A new five-inch pipe drain, with separate inspection chambers, has replaced one composed of open cylinders, while the dipstone traps and other obsolete interceptors, attached to soil and waste pipes, have been removed and have been substituted by others of improved construction. At the same time, the internal fittings of the scullery, w.c. sluices, sink, and lavatories have been entirely renewed, along with the soil, waste, and rainwater pipes, which are now placed outside the building and freely ventilated. The new drain is flushed twice a-day by means of an automatic flushing cistern, holding eighty gallons of water. These works have been very efficiently carried out by Messrs. Dent and Hellyer, of the Strand, and are well worth the inspection of members of the Congress. Somewhat similar arrangements, though on a much smaller scale, have also been adopted in connection with the separate building called the Clinical Home, already referred to. In the medical building, one-half of which was erected forty years ago, the main drain for the most part passes underneath the basement before it empties itself into the Metropolitan sewer. It is a tubular drain embedded in concrete and difficult of access, but it is well intercepted at its outlet, and the soil and sink pipes which enter it are freely ventilated from above. In the other half of the building, erected twenty years after the south wing and staircase, the soil and waste pipes are taken straight to drains which pass in front and to the rear of the hospital. The soil and sink pipes, although well ventilated, are embedded in the inside walls, and in this respect the arrangement does not differ from the practice common at the period when the building was constructed.

The water supply of the hospital has often been a subject of anxious consideration. More than thirty years since, when the intake of the Company which supplied the district was no further off than Lambeth and Vauxhall, the impurities were so palpable as to originate the belief that the water was the cause of an outbreak of cholera in the hospital at the time, the disease then existing in London. Shortly after this the Governors decided on sinking a deep well on the premises, and for many years the hospital was entirely dependent on this source for its supply. Owing to other wells being sunk in the neigbourhood the supply has been gradually diminishing, and at the present time it is barely sufficient to meet the wants of one-half of the hospital. Recourse has consequently been had again to the Water Company, which now supplies the old hospital and fire-mains, the artesian well water being confined to the medical building, to the large cistern of which it is pumped two or three times daily. The cistern is ninety feet from the ground level, and it has repeatedly occurred, when an accident happens to the well apparatus, that the supply of water from the companies' mains has failed to reach it. Similar failures have taken place in the case of other high buildings in the neighbourhood, and the local authorities, who are greatly exercised in the question in its relation to fires, are taking steps with the view of improving matters.

MIDDLESEX HOSPITAL FROM A SANITARY POINT OF VIEW.

By KEITH YOUNG, Esq., F.R.I.B.A.

THE Middlesex Hospital was founded in the year 1745, under the name of the Middlesex Infirmary. Its first home consisted of two dwelling houses in Windmill Street, Tottenham Court Road. In the following year the name of the institution was changed to its present form, and in 1847 a portion of the hospital was set apart for the reception of lying-in married women.

The premises in Windmill Street, ill-adapted probably from the commencement, soon proved inadequate to the growing requirements of the charity, and in 1755 the first stone of the present hospital was laid, and the new buildings occupied in 1757.

The site on which the hospital stands forms part of the Berners' Estate, and is a little over 1¾ acres in extent. With the exception of two houses in Cleveland Street on the east, and a narrow range of small houses on the north, the hospital site is entirely isolated from adjoining buildings.

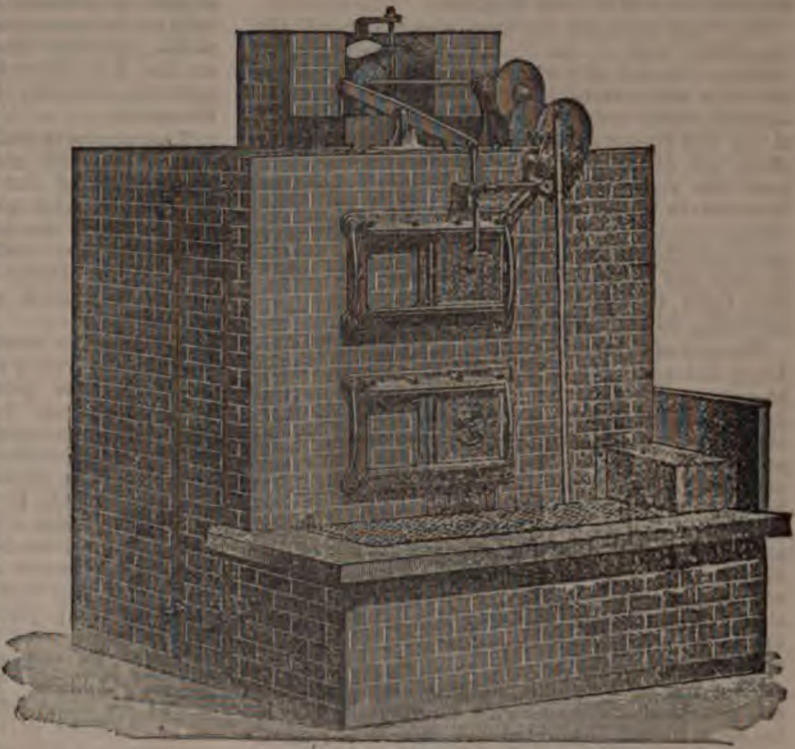
The hospital proper, together with the Home for Nurses and the Institute for Trained Nurses occupies the southern half of the site, and the buildings of the Medical School and the Residential College are ranged along the west, north, and part of the east boundary. The space thus enclosed forms a garden such as few metropolitan hospitals possess, and which has always been carefully kept up and jealously guarded from encroachment.

The main building of the hospital may be described as taking the form of the letter H, the central part being occupied entirely, except as to its top storey, by administrative offices and residents' rooms. The wings contain the wards, which are arranged in pairs—a large ward to the south and a smaller one to the north, with Sister's room, bathroom, &c., between each pair. The ground floor of the southern part of the east wing is occupied by the out-patient department. Parallel to the east wing is a range of buildings facing Cleveland Street. A part of these is on the ground floor occupied by a part of the out-patient department and dispensary, the remainder forming part of the Nursing Home and the Institute.

The space between the western boundary and the west wing is occupied by the operation theatre and its adjuncts, and the chapel, the latter being a recent addition not yet finished, erected partly as a memorial to the late Major Ross, M.P., for many years Chairman of the Weekly Board.

In the basement are the kitchen offices, stores, laundry, boiler house, etc. Here also is a subway connecting the hospital with the mortuary.

The total number of beds in the hospital is 307. Of these 34 are devoted to cancer patients, for whom a special charity exists founded in 1792, in order that patients suffering from this disease should find here a home until "relieved by art or released by death."



The mortuary and post-mortem-room are detached from the hospital proper except for the communication by the subway in basement. They form part of the range of school buildings on the west side of the garden. The bodies are conveyed from the basement to the mortuary on the ground floor or the post-mortem-room above by a hydraulic lift.

The problem of how to get rid of waste matters such as poultices, dressings, flock, and the refuse from the pathological department—all of them things of a specially offensive nature—came before us at the Middlesex Hospital as one demanding an instant solution when, some two years ago, it became necessary to demolish the old dust heap in order to make room for a new mortuary and post mortem room. I then suggested to Mr. Brophy, of the firm of Slater and Co., the possibility of devising a furnace which should fulfil certain conditions agreed upon between the resident medical officer (Mr. Fardon) and myself. These conditions briefly were (1) that the furnace should be capable of entirely destroying everything which would require to be burnt; (2) that the work of destruction should be carried out without the slightest nuisance or offensive smell; (3) that the apparatus should be, as far as possible, automatic; and (4) that all the foregoing conditions should be fulfilled with the apparatus in a given position and with a flue of a certain given and limited height. Upon these lines Mr. Brophy undertook the task, on the further stipulation that if the apparatus failed to comply with the conditions it should be removed and no charge made to the hospital. The apparatus is the outcome of Mr. Brophy's ingenuity, and may be seen working in a most satisfactory manner at the Middlesex Hospital.

The fuel chamber occupies the centre of the apparatus, and on each side is a regenerating chamber formed of perforated slabs of fire-brick. Between these slabs is a narrow channel which communicates with the space under the fire bars. Below the fuel chamber is a reversing valve which shuts off alternately each regenerating chamber from the smoke flue. At the back of the fuel chamber is a damper which opens or shuts the entrance to the smoke flue directly over the fire. In the smoke flue is a fan which is connected by a series of rods and cogwheels with a disc and lever which acts upon the tumbling gear connected with the reversing valve aforesaid.

The action of the apparatus is as follows: The fire being laid and lighted, the smoke is allowed at first to escape directly into the chimney, the damper provided for this purpose being open. The damper should be kept open until the fire is well alight and an up current is established in the chimney. The end of the lever handle attached to the damper can be fixed in position by means of a pin; but this pin will be automatically withdrawn, the lever released, and the damper closed when the disc in its revolution reaches a certain point. The object of this arrangement is, that the products of combustion should not be sent to waste up the flue if the attendant should be called away or forget to close the damper when the fire has burnt up.

The damper closed, the products of combustion are drawn over to one side or other, whichever happens to be open to the flue, and down through the fire-brick grids on their way to the flue. After a certain interval, determined, of course, by the speed at which the fan in the smoke flue rotates, the tumbling gear reverses the action and the products of combustion are drawn down through the other regenerating chamber. The air for supporting combustion is drawn up from the bottom through the opposite and now highly heated chamber, and passes partly down through the space between the fire chamber and the regenerating chamber to feed the fire at its base, and partly over the top of the fire. As soon as both regenerating chambers are sufficiently hot, the refuse matter to be burnt can be placed on the fire. The action of the fire-brick grids in the regenerating chambers is (1) to divide into a large number of streams the flames and gases of combustion, and thus to absorb the heat of those gases on their way to the chimney; (2) by absorbing the heat thus intercepted to destroy or decompose any noxious gases not already destroyed in the process of combustion, and which but for the interposition of the incandescent brickwork would be free to escape into the outer air; and (3) to raise to a high temperature the whole of the air required for combustion, so giving increased intensity to the flames and resulting gases, and ensuring more complete combustion.

The apparatus which I have thus tried to describe was set up in a small space allotted to it in a basement room under the post-mortem-room and mortuary at the Middlesex Hospital. The chimney which we were able to provide is of limited height, and is not a great distance from much higher buildings. It is, in fact, so placed that any nuisance resulting from it would be immediately felt in the hospitals and surrounding buildings. As a matter of fact, no nuisance has arisen at all, and I believe only on two occasions has any smell been detected at all. On both these occasions the refuse was put on the fire before sufficient time had elapsed to properly heat the firebricks in the regenerating chambers.

The mortuary building was erected in 1888, the site of the old mortuary and post-mortem-room being required for the chapel. The mortuary is itself lined with glazed tiles, and has a marble mosaic floor; the post-mortem-room is lined with glazed bricks, and has a "terrazzo" marble floor. The tables are made of Black Belgian marble, supported on specially-designed cast-iron frames.

Next to the mortuary is the chemical lecture theatre, with class room above; beyond these is a class-room for practical surgery, and materia medica museum. In the north-west angle of the site is the dissecting-room. Adjoining the latter is the large lecture theatre, museum, curators' rooms, and a smaller theatre. In the north-east angle of the site is the most recent addition to the school buildings, which contains in the basement lavatories and luncheon-room; on the ground floor students' common room, cloak-room, and porter's lodge; on the first floor the library; and on the second floor physiological class-room and laboratory.

Adjoining the last described building is the Residential College. This building was erected in 1886-7 by a limited company, and, though practically forming part of the hospital, is a quite separate and distinct institution. It affords accommodation for 33 students and a resident warden, and contains a large dining room, reading-room, and a common room.

COPPER IN THE CRUSTACEANS.—Harlen has shown that copper exists in the blood and liver of certain molluscs. In certain cephalopods it appears probable that copper exists in the state of a definite organic coloured compound which serves for similar uses to that of the hæmoglobine of higher animals. Von Bibra has found copper in the blood of *Cancer pagurus*, in which it almost replaces the iron. The blood of *Limulus*, a crab found on the North American coasts, is of a rich blue colour, and when dried and incinerated according to an analysis of Dr. Genth contains a mere trace of iron oxide and 0·3 per cent. of copper oxide.

KENSINGTON.

By Dr. T. ORME DUDFIELD, Medical Officer of Health for Kensington.

THE Royal Parish of Kensington, comprising an area of 2.190 acres, extends from Harrow Road in the North to Fulham Road in the South; its furthest point eastward is at the north end of Sloane Street, the West London Extension Railway forming for a considerable distance its western boundary. In 1856, when the Metropolis Management Act came into operation, the population was about 57,000, having risen from 8,500 in 1801: in 1861 it had increased to 70,000. The two following decades were marked by a still greater increase—50,000 in the first and 43,000 in the second, about 66,600 of the 93,000 increase being due to immigration. Thus, in 1881, the enumerated population was 163,151. The census of 1891 shows a further increase, but of 3,170 only—raising the official total to 166,321; males 65,629, females 100,692; excess of females 35,064—and this notwithstanding that the natural increase, by excess of births over deaths was 13,557. It follows, on the assumption of accuracy in the return, that there was a loss by emigration of nearly 10,400. This result is the more surprising and incredible seeing that, with an increase of less than 2 per cent. in population, there was an increase of more than 9 per cent. in the number of inhabited houses. In the opinion of competent judges, the normal population this year, cannot well be less than 178,000, or some 12,000 in excess of the census number. Kensington has the largest rateable value of any parish in the kingdom. In 1823 the rateable value was £76,000 only, now it exceeds £2,000,000, having increased by more than 21 per cent. in the last ten years. A penny rate is estimated to produce £7,700. The parish is divided, for registration purposes, very unequally, into two sub-districts, Kensington Town and Brompton; for municipal purposes into three wards, St. Mary Abbotts, Kensington; Holy Trinity, Brompton; and St. John, Notting Hill, and St. James, Norland. It is governed by a vestry of 120 members, of which the vicar (Hon. and Rev. E. C. Glyn, M.A.) is the chairman. The Town Hall, a modern building of palatial character, stands in the High Street, adjoining the old Vestry Hall, and opposite the High Street Station on the Metropolitan Railway. The sanitary staff comprises a medical officer of health, a chief clerk and two assistant clerks, four sanitary inspectors, two street inspectors, who also act as assistant-inspectors of nuisances, a disinfector, and a mortuary keeper. Adjoining the Town Hall (which includes a Coroner's Court), and in the disused parish churchyard, is a large and commodious public mortuary. The Public Library Act has been adopted, the chief library and reading-rooms being at the Vestry Hall; other two are situated in the north and south parts of the parish respectively. Splendid baths and washhouses have been erected at North Kensington; the number of bathers in the past year was 89,491, of washers 39,829. Near to the baths, and in the poorest part of Notting Dale, a large public recreation ground has been provided. The parish cemetery is at Hanwell, but there are within the parish two large cemeteries still in active use—at Kensal Green in the north-west, and at West Brompton in the south-west. The whole of the work of the parish—dusting, scavengering, watering, etc.—is done by the vestry's staff, comprising some 500 workmen, exclusive of officers; the stud numbers upwards of 100 splendid horses. Land has been acquired at Purfleet, to which the refuse —dust, slop, etc.—of South Kensington is barged from the vestry's wharf on the river at Chelsea. A site has been secured on the Grand Junction Canal at Kensal Town, on which a dock and other extensive works are in course of construction for dealing with the refuse of North Kensington, this division of work being necessitated by the great length of the parish, three miles and three-quarters north to south. At present the refuse is not utilised. It is in contemplation to obtain land for a "shoot" on the canal. The quantity of refuse collected last year was 90,264 loads, viz., ashes, etc., 44.549 from 22,000 houses, and slop 45,715 loads from 82½ miles of streets. The amount raised in rates last year was £485,115, of which sum £112,480 was expended by the Vestry, and something less by the Board of Guardians, whilst about a quarter of a million went to meet the demands made on those bodies, for metropolitan purposes, by the County Council, the School Board, and the Asylums Board. Excepting one estate (St. Quintin's) in North Kensington, and the park surrounding famed Holland House in the central district, Kensington is now nearly built over, and land has attained an almost fabulous value. An interesting illustration of the enhanced value of land is afforded by the investments made by the Trustees of the Campden Charities. The capital sum invested some 250 years ago in the purchase of 21½ acres was £465. Portions of the land have been sold in recent years for £51.000, the money being invested in City ground rents, etc. The income of the Charity, £54 in 1777, £186 in 1810, had risen to £667 in 1853. It is now nearly £4.400, with reversions to rack rents of enormous value, "all derived from the original investment of £465 in land in the middle of the seventeenth century." In this rich parish there are some 180 mews, irrespective of separate stables, many of them containing fine premises, with excellent accommodation for man and beast. The slaughter-houses, which, prior to the passing of the Slaughter-houses (Metropolis) Act, 1874, were 48 in number, are now 21 only, the decrease having been brought about by the high standard of the Vestry's requirements. In like manner the number of cowhouses has fallen from 26 in 1878, when, by the first Dairies, etc., Order, these places came under regulation, to 10 at the present time. This parish was the first to insist on an adequate amount of cubic space in cowhouses. The bakehouses under constant supervision number 148. There are numerous drinking fountains and water-troughs. Of public conveniences there are not very many: water-closets in two situations only, lavatories in one: but by efforts made three or four years ago considerable improvements were effected in the accommodation provided at about 170 public-houses. An effort is now being made to improve the means of storage of stable refuse, and it is hoped that the Public Health (London) Act will lead to the abolition of sunken dung pits. The Lodging House clauses of the Sanitary Acts (1866 and 1874) are in operation, and about 1.800 houses have been registered—for it must be understood that this wealthy parish contains its full proportion of the poorer classes. In passing it may be mentioned that the sick poor are well cared for in a large modern infirmary (certified for 592 inmates), adjoining the picturesque workhouse (certified for 904 inmates), mainly occupied by the infirm; that able-bodied paupers are dealt with in a separate labour house (certified for 90 inmates); and that the children are educated and trained in schools in the country, under the care of foster parents in charge of "cottage homes." Public vaccination is conducted at two stations, the option of calf-lymph being always given. But to resume. The Kensington Vestry have for many years been distinguished for active interest taken in matters of public health affecting the metropolis as a whole, and it is to their credit that many of the views they endorsed so long ago as 1877, with scant sympathy from other sanitary authorities, have come, one after another, to be universally accepted and carried into effect. It is largely due to their initiative that the pauper hospitals for infectious diseases, created under the provisions of the Metropolitan Poor Act, 1867, have been freed from the taint of pauperism, and made available for all classes, on the application of medical practitioners, and without any charge. Depauperisation was effected by the Disease Prevention (Metropolis) Act in 1883. For this and other movements of reform, the metropolis is mainly indebted to the great Conference of sanitary authorities convened by the vestry and held at the Town Hall in 1881, at which unanimous resolutions were adopted in support of compulsory notification of infectious disease, free infectious disease hospitals as a metropolitan charge, depauperisation of the hospitals, and compulsory removal in suitable cases. The vestry, moreover, led the van in opposition to attempts to compel the sanitary authorities to provide local infectious disease hospitals under the provisions of the Sanitary Act of 1866.

It was on the occasion of the deputation to the Local Government Board, to present the resolutions arrived at by the Conference, that the Medical Officer of Health propounded his scheme for the treatment of small-pox patients out of London, which was immediately adopted with happy effects —the deaths from this disease during the last five years having aggregated 47 only. To the present Medical Officer of Health for Paddington, is due the credit of having first proposed that the Asylums Board should undertake removal of the sick to their own hospitals, a plan to which the Poor Law Act, 1879, gave effect; but it was from Kensington, in 1884, that the suggestion came that the Board should assume the functions of a Metropolitan Ambulance Authority for the removal of all such cases in London—a plan now happily carried into effect under the provisions of the Poor Law Act, 1889. Thus this Board, created for dealing with paupers only, has now, by natural evolution, become the Central Hospital and Ambulance Providing Authority for the entire metropolis, and that with universal approval. It was from Kensington that the suggestion came for utilising the organisation of the School Board, by co-operation with the sanitary authorities, for discovery of cases of infectious disease, and the further suggestion that the control of vaccination arrangements should be transferred from the Poor Law to the Sanitary Authority. Recommendations with regard to the storage, collection, removal, and disposal of refuse originated in this parish, as well as a vigorous attack upon the cutting-off powers of the water companies. An *inquiry*, brought about with the sanction of the vestry, had the effect of securing a more stringent enforcement of the law with respect to glanders and farcy in horses. On the whole, then, the record of the vestry is a creditable one, and proves Kensington to be not unworthy of its courtesy-rank—to which, moreover, it may by its wealth and splendour claim some title—as premier parish of this great metropolis.

A SANITARY SURVEY OF CHELSEA.

By Louis C. Parkes, M.D., D.P.H.Lond., Medical Officer of Health.

Chelsea is one of the old London parishes, and parts of it still have an old world appearance, strangely contrasting with the modern suburban architectural effects of the more recently-built houses. The population of the parish is just over 96,000, but of this number some 23,000 reside in Kensal Town—a part of the parish of Chelsea, but separated from Chelsea proper by the entire width of Kensington. Kensal Town is a newly-built district, peopled very largely by the working and trading classes, whilst Chelsea proper is more of what is known as a residential neighbourhood for the well-to-do, and is becoming more so every year, as the small streets in the east end of the parish give place to large squares and gardens, the people displaced, as a rule, migrating to Battersea and Fulham, where house rent is lower.

For a parish so near to the heart of London and the West end (Regent Street, Charing Cross, etc.) as Chelsea proper is there is very little crowding of population, and there is a large amount of open space in the form of gardens. Most of the streets are very wide and airy. The courtyards and gardens of the houses, even of the smallest cottages, are, as a rule, large and roomy; whilst the houses are, for the most part, one or two-storeyed, so that the access of light and air to the dwelling-rooms is all that could be desired. Chelsea has been but little, as yet, invaded by the giant model dwellings, which house the population of a village on half an-acre of ground, and shut out the light and air from many of their inmates.

Whilst so much of the house property in Chelsea consists of cottages well lighted and ventilated, and with plenty of open spaces about them, there are numbers of houses which by reason of their age are now falling into disrepair, and the drainage is often of the type common in the first half of this century, so that there is no lack of work for the sanitary staff.

The health of the resident population is extremely good, and the mortality from those diseases classed as preventible is sufficiently low to compare favourably with most metropolitan parishes. The general death-rate is probably somewhat raised by the fact of the average age of the population being higher than in most London districts, owing to an excess of persons over fifty years of age. The army and naval pensioners in the Royal Hospital and the workhouse inmates are nearly all of advanced age, and there are many parishioners resident who have spent all their lives in the parish.

Chelsea is sewered on the same plan as the rest of London, brick sewers of large size receiving the sewage of houses and the storm water from roofs and streets. The parish is traversed by some six large main arterial sewers vested in the London County Council, which, formerly discharging direct into the Thames, are now connected with a low level sewer running from west to east along the bank of the Thames to the Grosvenor pumping station. These sewers are of large size, and conveying as they do the sewage of remote parts of the metropolis, the air that escapes from them is often very offensive owing to the foulness of the sewage, especially in hot weather.

The usual plan of ventilating the sewers is by gratings in the centres of the roadways communicating with the crowns of the sewers. In Jubilee Place a special method of ventilating the dead end of a sewer has been adopted by means of shafts up the walls of houses. There are three such shafts; the upper end of the middle shaft is surmounted by a cowl which faces the wind and introduces fresh air into the sewer, whilst the tops of the extreme shafts are surmounted by cowls which back to the wind and allow the sewer air to escape.

Chelsea proper is supplied with water from the Chelsea Waterworks Company, which derives its supply from the Thames at Molesey. The greater portion of the parish is still receiving an intermittent supply, and in certain streets complaints of short supply or foulness of water from storage in cisterns are frequent. A constant supply throughout the parish is much needed, and it is hoped will soon be forthcoming.

There are very few offensive trades in Chelsea. The Refuse Disposal Company in Lot's Road carries on a process of sorting dustbin refuse by appropriate machinery, extracting what is valuable, and manufacturing brown paper and patent fuel, whilst the valueless materials are burnt in a furnace. The work is, as a rule, carried on without engendering nuisance, and apparently at a profit; it is specially described in this number (see page 33).

The dust-refuse collection and disposal is placed in the hands of a contractor, as is also that of slopping and watering the streets. The collection and removal of offensive trade refuse and stable manure is left to private effort. Most of these offensive matters are taken in barges down the river, and disposed of on the shores of Essex and Kent.

The removal of fever cases to hospital is in the hands of the Metropolitan Asylums Board. Infected clothing is removed in a van belonging to the sanitary authority to a disinfecting station in Lot's Road, where it is purified in a Ransome's disinfecting oven, heated by gas. The station has a clean and an infected side, and is convenient and roomy, but the length of time taken to disinfect thoroughly by hot, dry air is a serious drawback in practice. Disinfection of premises is carried out as a routine practise in all cases of infectious disease after removal, death, or recovery of the patient.

There is a mortuary close to the Town Hall, with the usual rooms and conveniences on the most approved pattern.

There are a number of slaughter-houses scattered about the parish, the arrangements in some being of a rather primitive character. A parochial abattoir, under the supervision of the sanitary staff, would be a great sanitary advancement on the present practice.

The hospitals in the parish are part of the Brompton Consumption Hospital, the Hospital for Women, Cancer Hospital, Victoria Hospital for Children, Hospital for Incurable Children, and St. George's Infirmary.

OBJECTS OF INTEREST TO A SANITARIAN IN FULHAM.

By Dr. Cooney, Medical Officer of Health.

Fulham Union Infirmary.

This institution was opened in the year 1884, and has accommodation for 484 sick poor and a staff of about 60 officers, and is the most complete establishment of its kind, consistent with the fact that it has been erected at a much less cost than similar establishments, though containing every requisite of a good hospital. The infirmary buildings, with fittings and fixtures throughout, cost £51,422. The infirmary proper, with all its sanitary appliances, gas and water supply, etc., cost but £116 per bed, whereas similar institutions have cost £150 per bed. The new laundry, washhouses, coal stores, engine and boiler house, and other works for the Fulham Workhouse (distinct from the infirmary, but worked by the same machinery for economy's sake) have cost an additional sum of £4,640.

General Arrangements.—The buildings comprise a central block, in which are placed the whole of the official and administrative departments, offices, and the quarters of the official and nursing staff.

On the right hand of the central are placed two main blocks or pavilions for males, and one subsidiary one for special cases; and on the left two main blocks for females, and one subsidiary one for special cases. Between the two wards on each side, which are alike, are placed the receiving rooms for patients.

The main blocks are three storeys in height, and consist of wards 96 ft. long and 24 ft. wide, containing 32 beds each, with the necessary ward kitchens attached. Bath-rooms, lavatories, etc., are provided in angle buildings at the end, with an open balcony between same. Lifts are provided to each block, and a corridor of communication connects each block with the central or administrative block, whilst a gallery over this connects the blocks themselves, thus saving time and labour to the medical officers and officials, and affording a spot in which patients not sufficiently strong to use the airing courts can obtain air and moderate exercise. The total accommodation for patients, inclusive of isolation wards on the various floors, is 446 beds, each patient having, whilst in the wards, an allowance of 880 cubic feet of air space. By adopting the great length of ward, economy of nursing arrangements is obtained, no more nurses being required to attend to 32 patients in a ward than would be if only 28 were accommodated. At the front of each ward, separated from it by the corridor afore-mentioned, is a cheerful day-room, and above this isolation wards for acute cases.

Ventilation and Heating. — The ventilation of wards is by simple and natural means; inlet ventilators are provided at floor level, at back of coils of hot-water pipes, so that the fresh air from the outside passes over and through these coils, and comes into the wards moderately heated in the winter. Outlet ventilators are placed high up in the walls, simple openings (without up-cast shafts), covered inside with finely-perforated zinc, uncloseable, and are for the egress of vitiated air and noxious gases. All windows are double hung, with wide bottom rails and beads, so that they can be opened to admit air at the meeting rails, without draught at the bottom.

The heating of the wards is provided for on two systems, viz., stoves in centre of wards, of Messrs. Yates, Haywood, and Co.'s make, with an underground smoke flue taken to the outside walls, and fresh air supplied to them from the opposite side by a horizontal cold-air flue.

These stoves are a modification of Captain Sir Douglas Galton's well-known ones. In addition to these, a hot-water circulation is provided by a flow and return pipe round each ward, developed into coils under windows. It will be thus seen that the temperature can be regulated to any extent in these wards; that the double system provides a cheap and ready means of heating to suit all seasons of the year, and the cheerfulness and comfort of the open fireplace is not sacrificed, but made an important factor in the ventilation of the wards.

Lighting.—The whole of the buildings are lighted by gas, the burners being placed in the wards on brackets at the sides, immediately under the outlet ventilators, so that the whole of the products of combustion are conveyed at once through the outer walls. Brackets over the beds have been preferred to the usual central lights, as not only giving an appearance of greater airiness to the wards, but as less likely to interfere with the repose of restless patients; the light is also more generally diffused.

Water Supply and Security from Fire.—The water for the use of the establishment is supplied by meter, at high pressure, to all parts. There are reserve tanks in the tower to contain a supply during any temporary stoppage through repairs to mains or otherwise.

Fire mains are carried through every part of the building, and hydrants are placed on each landing of staircase of wards, and at various other parts of the building, and in the airing courts and yards; further security from fire is provided by the open balconies at the end of each ward (which can be provided with suitable appliances), and the gallery connecting the wards at the opposite end, provides an exit for patients on each floor in case of need.

Sanitary Appliances and Drainage.—All the lavatories, etc., are lined with white glazed bricks or tiles; all soil pipes are taken up for ventilation their full diameter; all waste pipes from baths, lavatories, etc., discharge over open gratings trapped with Dean's traps, so that no pipes are directly connected with the drains, nor can any effluvium enter the building.

The drainage is effected by means of glazed earthenware socketted pipes. A main drain runs the whole length of the front of the building, and discharges into the main sewer in the Fulham Palace Road, through a special and purpose-made trap. The drainage from each block, etc., is taken in straight lines into this main drain, with man-holes at all junctions, and lamp-holes at frequent intervals. All the w.c.'s are trapped, but between them and the purpose made traps leading into the main sewer, there is no trap or obstruction of any kind. The advantage of this arrangement lies in the facility with which the business of flushing the entire system can be performed. The drains have a good fall, all the man-holes are ventilated, and every soil-pipe is an outlet ventilator also.

FULHAM UNION WORKHOUSE.

This building was erected between forty and fifty years ago, and including the use, temporarily, of old administrative offices, is, for the present, certified to hold 525 persons. It is ill-arranged and badly constructed, and in consequence of its numerous defects and want of further accommodation, considerable alterations and additions are about to be made at a cost of £25,000. It is proposed to increase the accommodation for inmates to about 750.

CASUAL WARDS.

These wards were erected in the year 1878 at a cost of nearly £8,500. They are upon a system of a separate compartment and working cell for each person admitted, and contain accommodation for 42 men and 20 women with rooms for resident superintendent.

FULHAM UNION OFFICES.

These buildings bring under one roof the guardians' offices and board room, the dispensary, relief offices, and the workhouse receiving wards; thus ensuring greater convenience of administration and economy of working expenses than was possible when these departments were situated in different buildings and places, and were erected at a cost of about £18,000 this year.

Central Block.—The offices and board-room are situated in the central block, and are approached by paved carriage and footways from the public road. On either side of the central entrance hall are the Clerk's and Registrar's rooms, each with a fireproof strong room immediately adjoining. Beyond the entrance hall is the principal staircase leading to the board-room, etc. On the left of the staircase is the general clerks' and inquiry office, and on the right the Guardians' entrance to the Relief Committee room. Beyond the staircase, and approached by a short lobby, is the Assessment Committee-room, with a cloak-room adjoining for the members. Below this room, in the basement, is the boiler-room, fitted with heating and hot-water furnaces. The board-room, situated on the first floor, and overlooking the main road, is a large and lofty room, carefully planned and fitted with a view of ensuring the convenient transaction of business and the comfort of all—whether members of the Board, the press, or visitors. Alcoves on either side of the entrance lobby are fitted with seating for the accommodation of the press and the ratepayers. On the same floor there is also a large general committee-room, ladies' and gentlemen's retiring rooms, and a room for the use of persons waiting to see the Board. On the second floor, and partially in the roof, are the housekeeper's apartments, book store, &c.

South Wing.—The south wing contains the relief offices and the dispensary. The relief offices comprise two lofty, well-ventilated, and warmed waiting rooms, connected by a wide corridor. On either side of this corridor are three relieving officers' rooms, each with its separate hatchway and barrier, and the committee-room for inquiry by the guardians into the *bona fides* of applicants for relief. Beyond the smaller waiting-room are the general relieving officer's and collector's rooms, and the relief stores. The dispensary building contains a waiting-room, three doctors' consulting-rooms, and a dispensary.

North Wing.—The north wing contains the male and female receiving wards and porter's apartments. The entrance and waiting rooms are approached from the public road by an open covered way. An arcade leads from the waiting-room to the receiving wards and porter's apartments. The male wards have accommodation for twelve inmates, and in connection with them are a bath-room, linen store, latrines, lavatories, and an airing yard. The female wards are situated at the end of this block, and have similar accommodation and conveniences. On the upper floor, and partly in the roof, are two large stores for the safe keeping of the paupers' own clothing and, if necessary, their furniture. The latter room meets what has hitherto proved to be a great want in the workhouse system. It is provided for storing the furniture of those who being compelled through temporary misfortune to enter the workhouse for a short period only—mostly during the winter months when work is scarce—would otherwise, by the existing system, find themselves under the necessity of parting with all they possess. Provision is thus made that, when a chance is again afforded them of starting in the world, they will not be handicapped by the necessity of re-furnishing their home.

CORONER'S COURT AND MORTUARY.

This was erected in 1890, at a cost of £1,045, and is a one-storied building. A side corridor leads to an intervening courtyard, which separates a room fitted up as a Coroner's Court, having behind it a room used for witnesses. At the back of the court are two lofty rooms placed behind each other, and in line with the Coroner's Court and witnesses' room; one is used as a room for post-mortem purposes, and is provided with a marble slab table with raised edges, and a marble wash-hand basin, hose, etc.; the other room contains eight shells to hold bodies. No provision is made for infectious cases. This building is conveniently built in the Fulham Cemetery, adjoining the east entrance.

WESTERN FEVER HOSPITAL.

This is one of the six hospitals under the Metropolitan Asylums Board, situated in Seagrave Road, Fulham, and has accommodation for 262 cases of infectious diseases, viz., scarlatina, 210; diphtheria, 20; enteric, 24; other diseases, 8. The districts allocated to this hospital are Fulham, Kensington, Chelsea, St. George's, Hanover Square, Bloomsbury, Westminster, Strand, having a population in 1881 of 641,379, or the ratio of one bed to 2·448 persons. It was opened in 1877, and has an acreage of 6a. 1r. 14p., and cost up to 1891 the sum of about £68,000. In consequence of the inadequacy of the existing accommodation for subordinate officers, and partly in anticipation of an early enlargement of the hospital to meet the increasing requirements of the district allotted to it, it has been decided to enlarge it to hold 170 more beds.

AMBULANCE STATION.

This is at Seagrave Road, and was opened in 1883, and cost about £8,000.

WEST WHARF.

This has an acreage of 2a. 2r. 10p., and with pier cost about £14,000.

HAMPSTEAD.

(Inhabited Houses, 9,528; Population, 68,425).

By Dr. GWYNN, Medical Officer of Health.

THE parish of Hampstead, favourably situated on the northern heights of London, and for the most part covered with modern and well built houses, possesses a beautiful heath of over 500 acres of varied meadow, hill and dale, which forms a magnificent playground, and is a source of healthful enjoyment to the teeming inhabitants of North London. The New Vestry Hall, erected in 1874, is a handsome building situated on Hampstead Hill, and contains a Public Hall which is in great request for public meetings, balls, etc., and brings in an income of more than £500 a year. The dust, animal, and vegetable refuse collected weekly by the carts of the Vestry from houses in the parish is carried by patent vans belonging to the Vestry to their destructor at Willesden. The destructor, erected by Manlove and Co., consists of eight cells, and is capable of dealing with fifty tons of house refuse per day. In addition to the destructor, the cottages, stables, horses, and various implements and appliances for dealing with house refuse are to be seen at the Willesden wharf. Public swimming baths in Finchley New Road were opened in 1888. The baths comprise four swimming baths (two of which are 100 ft. in length), and twenty-four private baths which, together with site and appliances, have cost over £30,000.

At the parish stone-yard is to be seen the Washington Lyon steam apparatus for disinfecting articles of clothing and bedding, etc., and here also is situated the house of refuge for poor people during the time occupied by the disinfection of their rooms.

At Flash Walk and Palmerston Road, wash-houses, with some private baths attached, have been provided for the poorer classes by the Wells and Camden Charity.

This charity has also built in Heath Street a set of improved artizans' dwellings at the cost of £14,000.

The parish mortuary was opened in 1891 at New End, and is a compact and well-arranged building, with rooms for the reception of infectious and non-infectious cases.

Opposite to the mortuary is situated the workhouse infirmary. A new circular ward, containing 72 beds on three floors, was built in 1883 from the designs of Messrs. C. Bell and C. K. Wild. These wards are constructed round a central shaft which is used for purposes of heating and ventilation. The wards are open to the S.W., and command a most extensive view, with a free circulation of air.

Hospitals.—There are three hospitals properly so-called; the North-Western Hospital of the Metropolitan Asylums Board, the North London Hospital for Consumption at Mount Vernon, and the Home Hospital and Nursing Institute in Parliament Hill Road.

The North-Western Hospital contains over 400 beds, arranged in eight temporary wards, and is provided for the reception of fever cases.

The Hospital for Consumption, a handsome and skilfully arranged structure, stands on an eminence overlooking the Surrey Hills.

In addition to the foregoing, may be mentioned other cognate institutions, such as the Hampstead

Nursing Association in Lynhurst Road, St. Peter's Home, Kilburn, and the Provident Dispensaries.

The Blind School, established by the London Society for Teaching the Blind, was brought in 1847 to its present site near the Swiss Cottage. Children are provided for at the Home in Goldsmiths' Place, Kilburn.

The Industrial Home for Girls, Trewint, receives forty inmates, and the Field Lane Refuge, situated in Hillfield Road, West Hampstead, trains up 200 boys and girls, former "street arabs" of our great metropolis, belonging to the most disreputable classes.

The Soldiers' Daughters' Home, for training the daughters of men in the regular army for domestic service, is situated on Rosslyn Hill, and a similar institution for daughters of sailors is to be found in Greenhill Road.

ST. PANCRAS.

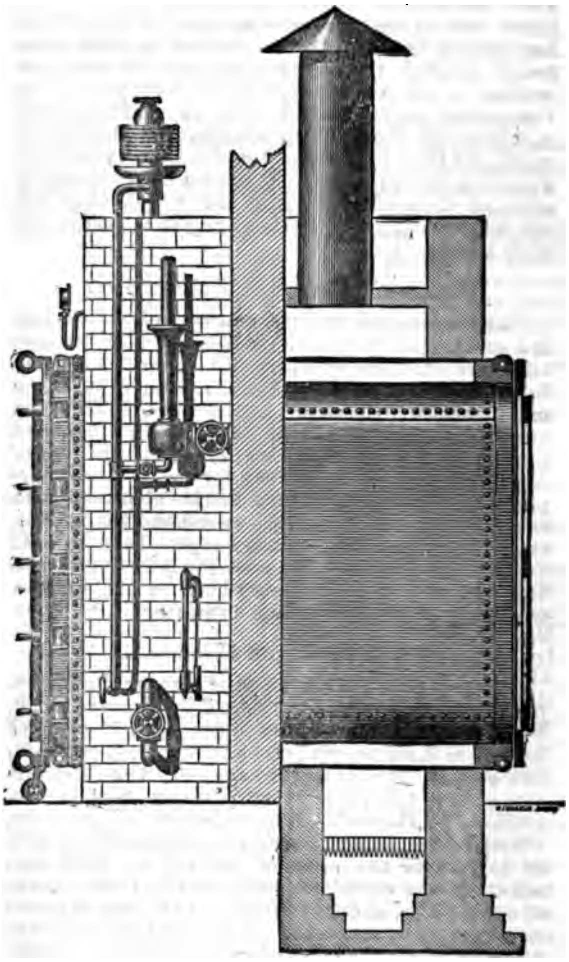
(Inhabited Houses, 24,611; Population 234,437).

By Dr. SYKES, Medical Officer of Health.

THERE are three things in St. Pancras of such general sanitary interest that they may be thought worthy of a visit, viz. (1) the Disinfecting Chamber; (2) the Coroner's Court and Mortuary, and (3) the Model Dwellings.

The Disinfecting Chamber.—This is a chamber in which steam may be applied at either high or low pressure, or in current or still, as well as hot air in current or still, for the purpose of disinfecting bedding, clothing, and other goods. At the side is a destruction chamber for the burning of bulky useless infected articles, the furnaces of the two chambers being surmounted by a tall brick chimney. The ordinary conveniences for storage, etc., on both the infected and disinfected sides of the building are provided, and also horse vans for the conveyance of goods to and from the chamber.

This chamber is rectangular (see diagram), with the angles rounded, in order to avoid lodgment and give additional strength. Its internal dimensions are—height 5 ft., width 5 ft., length 6 ft. 6 in. It is entirely surrounded by a double jacket, and the doors are also double jacketed. The space (about four inches) between the two jackets is filled in, the lower half by water, and in the upper half and doors steam circulates. The water is heated by a furnace underneath; it takes about an hour to get up steam. A safety valve is situated on the top of the chamber. Steam is admitted into the chamber from the jacket through a screw-down valve, and it is withdrawn from the chamber through a screw-down valve by a steam exhaust pipe discharging into the chimney. Two dial pressure gauges over the door mark the pressure and temperature in the jacket and chamber respectively. A supply of hot air is laid on through a channel furnished with baffles and running at the back and along the side of the furnace, and discharging through a screw-down valve into the chamber. This pipe, at my suggestion, has been furnished with a thermometer to mark the temperature at which the hot air is admitted, and the temperature is regulated by a cold air supply tap which has been also attached. The apparatus is worked in the following manner: Having raised the steam in the jacket to 20lbs. pressure, the chamber is charged with the articles to be sterilised and the doors are clamped. The exhaust valve is opened and also the hot air valve, by this means the cooler air is withdrawn from the chamber and displaced by the current of hot air. This seems to thoroughly dry the articles and to displace the cooler air from their interstices which otherwise might cause condensation of the steam. The hot air valve is now closed and the steam supply valve opened, and then the exhaust valve is closed. In about ten minutes a pressure of 20 lbs. and temperature of 260° F. is marked in both chamber and jacket. The steam supply valve is now closed and the exhaust opened until the pressure gauge of the chamber runs down to zero. This intermission only occupies about one minute, and is necessary to insure complete penetration by the steam. The exhaust is now closed and the steam valve again opened; in another ten minutes the two gauges will both be found to mark 20 lbs. pressure and a temperature of 260° F., with a temperature of at least 212° F. in the interior of mattresses, pillows, and other bulky articles. This has been repeatedly proved by actual experiments. The steam valve is now closed, and the exhaust valve and the hot air valve



are now opened to drive out the steam. This accomplished, the chamber is opened and the articles taken out the opposite end to which they were introduced into a separate room free from infection and infected articles.

The advantages of the apparatus beyond the supreme advantage of high pressure steam are twofold. The square shape permits of full-sized mattresses being laid flat and provides for great capacity. The complete double jacketing, together with the hot blast, entirely prevent any condensation. There is economy of space, of heat, and of steam in having the boiler and the chamber in one complete. The apparatus, roughly, cost £200, inclusive of boiler, but exclusive of fitting and extras. Two hand-trucks are employed, the one to bring infected articles and the other to return disinfected articles.

These mortuaries, as well as the disinfecting chamber, are situated on the east side of St. Pancras Gardens, at the north end of Pancras Road, Euston Road, about a quarter of a mile north of the Midland Railway station. The gardens themselves are very picturesque—old St. Pancras church embellishes them on the south, and they are enclosed by very handsome hammered iron railings and gateways, recently erected. Instructions have been given to the caretaker to admit all members of the Congress, and afford them every information. Dr. Smith, Chairman of the Sanitary Committee of St. Pancras, will, as far as possible, facilitate inspection and inquiry by visitors.

Artizans Dwellings.

Another point of interest in St. Pancras, just before reaching the gardens from the south, and on the west side of the Pancras Road, is a large block of artizans' dwellings, called Pancras Square. These buildings, the first block dwellings erected in the metropolis, were constructed in the year 1846 by the Metropolitan Association for Improving the Dwellings of the Industrious Classes, an Association which, two years later, under the auspices of His Royal Highness Prince Albert and Sir Robert Peel, was granted a Royal Charter. The Association still continues to carry on the work in which it was a pioneer.

The Mortuaries and Coroner's Court.

Within the same precincts are three mortuaries—one for infectious cases—and a post-mortem examination room, as well as coach-houses, store-rooms, etc. Adjoining is the caretaker's house and a handsome coroner's court for public inquiries into the causes of death. The coroner's court is one of the handsomest in London.

Water Supply of Lanarkshire.—Lanark has been suffering from a water famine. Sir W. W. Hosier was compelled lately to leave his country seat, Maudslie Castle, with all his establishment, because he found there were only two days' supply. In some places people have been carrying water for 800 yards, in others they have been drinking stagnant water from "lint" holes. The County Council discuss the matter in order that public attention should be directed to it, whereas, instead of discussing, if they invited schemes of water supply from engineers, something practical might be done.

WHAT THERE IS TO SEE IN WHITECHAPEL.

(Inhab. Houses 8,170, Pop. 74 420.)

By Dr. Loane, Medical Officer of Health.

Whitechapel.

This district adjoins the City of London at its eastern boundary. It consists of 406 acres, of which 27 acres are water. In the district are 22 miles of streets, all being paved either with granite or wood. At the recent census its population numbered 74,462, being an increase of 3,099 persons since 1881. It is almost equally divided into north and south by a continuation of the main City thoroughfare, which, prolonged in an easterly direction, passes through Middlesex into Essex. Within the Whitechapel district are contained the Royal Mint, the Tower of London, the London and India Docks, besides some of the most important of the metropolitan wharves. The London Hospital and the Poor Law Infirmary, each accommodating nearly 800 sick persons, are situated close together. The latter institution, both medically and as regards its nursing arrangements, is well up to modern views. The clerk, W. Vallance, Esq., is always willing to explain the action of the guardians in dealing with pauperism—an action commenced in Whitechapel, but now generally adopted elsewhere.

From a sanitary point of view, Whitechapel has made rapid strides during recent years. It was here that the late Metropolitan Board of Works initiated proceedings under Cross's Acts, and thus were exchanged large blocks of model dwellings for insanitary houses which previously existed. These model dwellings have continuously increased in number since, until at the present time about 9 per cent. of the entire population are lodged in them. It is debateable, of course, as to how far such barracks should be permitted to extend within the metropolis, but it cannot be denied that the removal of slums to make room for model dwellings has been a distinct gain up to now for the class of persons who occupy them.

It is worthy of mention that the poorer portions of the district are mainly inhabited by foreign Jews, who are occupied mostly as tailors, bootmakers, etc. Although these aliens are far from perfect in their knowledge of sanitation, yet as citizens they make a peaceable and law-abiding people. From their general habits one might forecast dire disaster, but from their tendency to longevity and from their abstemiousness, the foreign quarter compares favourably in its mortality statistics with better conditioned localities,

The common lodging-houses, again, constitute a very useful—if not a highly ornamental—means of housing about 10 per cent. of the district population. These police-registered houses, together with Salvation Army shelters, and one of Barnardo's Homes, besides offering temporary shelter to the poor and outcast, frequently serve as feeders for the union infirmary and workhouse. A study of the phases of life which are here presented for the view of any keen observer, whilst of interest to most, must prove of the highest importance to the social reformer.

The mode of collection and disposition of house garbage which has now been in use in Whitechapel for some five years demands brief notice.

Pails are distributed throughout the district, and generally their contents are emptied daily into carts to be conveyed to the destructor in Wentworth Street. Here, after being treated in the furnaces, the refuse becomes converted into a clinker which is inodorous, harmless, and even useful.

To quote from Mr. W. La Rivière, the Board's surveyor: "The level of the site is in two gradients, one up to the top of destructor furnaces, the other down to the stoke-holes. The carts of refuse ascend the high level, and discharge into the furnaces, and the residuum of clinker is taken out at the lower level and carted away.

"The destructor consists of cells placed back to back in pairs; these have been constructed, using the two best descriptions of materials which could be obtained, with the view to ascertaining which will stand the expansion and contraction the best, as also to compare the wear and tear of each.

"There is an underground flue from the destructor to the shaft. It is 7 feet high and 4 feet wide, connecting the former with the latter, and along this the products of combustion travel, then up the shaft, the distance being about 300 feet.

"The brickwork of the furnaces is within one foot of the walls of adjacent dwelling-houses, without causing the least inconvenience. Notwithstanding the intense heat inside the furnaces, the bare hand can be held without danger on any external portion of the structure."

A mortuary is in process of erection. It will contain a coroner's court, and also commodious waiting-rooms. In the plans are included a room for bodies dead of infectious diseases, and in addition, provision has been made in conformity with Hebrew rites.

A novel feature in the mortuary proper will be the introduction of well-ventilated catacombs, each to contain one coffin. This arrangement is an economy of space, and it precludes all possibility of the escape into the room of emanations from the coffins. The whole of the rooms have been erected upon iron columns and girders filled in with thick concrete.

Amongst other places of interest, including ample educational provision for the young, recreation grounds are scattered throughout the district.

Whitechapel has taken advantage of the Free Libraries Act, and the district also contains public baths and wash-houses, which are taken advantage of to the fullest extent.

Dr. Loane, the medical officer of health for Whitechapel, will be happy to invite any members of the Congress to view any objects of interest which they may desire to investigate.

THE DINNER OF THE PUBLIC HEALTH MEDICAL SOCIETY.—The dinner to be given by the Public Health Medical Society promises to be highly successful. It takes place in the Venetian Chamber of the Holborn Restaurant on Wednesday next. Sir C. A. Cameron will, we understand, be supported by Dr. Brouardel, of Paris; Sir D. Galton, Sir D. Maclagan, Dr. Buchanan, Professor Corfield, Professor Wynter Blyth, Mr. Malcolm Morris, the President of the Royal College of Surgeons of Edinburgh (Mr. Grainger Stewart), Dr. Lovett, with the members of the Health Society and several other distinguished guests. Hence it will be a good and representative gathering.

THE MODEL DWELLINGS OF ST. GILES', 1891.

By **SAMUEL LOVETT**, L.R.C.P., Medical Officer of Health, President of the Metropolitan Branch of Health Officers.

THE members of the International Congress of Hygiene and Demography can visit the following improved blocks of model dwellings for housing of the working classes:—

I. Model buildings belonging to the Peabody Donation Fund. (α) The Great Wild Street block, situated in Great Wild Street, Drury-lane, W.C. (β) The Little Coram Street block, situated in Little Coram Street, Russell Square, W.C.

These model buildings have been erected under the provisions of the Artizans' and Labourers' Dwellings Act, 1875, upon two areas where the dilapidated and worn out back-to-back houses built in narrow, close courts and alleys, were condemed as unfit for human habitation (1) because of their narrowness, closeness, and bad arrangement and condition; and the want of light, air, ventilation, and other sanitary defects, which rendered them dangerous to the inhabitants of the buildings or the neighbourhood. (2) Through the high death-rate (between 50 and 60 per 1,000), especially amongst young children. (3) The prevalence of typhus fever in both areas, which, since the erection of the new buildings, has entirely disappeared from the district.

The following particulars of the two blocks of buildings may be interesting:—

A. Great Wild Street Block.—Consists of 13 blocks lettered A to W respectively. Area in square feet—(1) Ground within which the building stands, 63,360; (2) the dwelling itself, 29,250; persons to an acre, 980. In the year 1890 they were inhabited by 1,430 people; of these 264 were under 5 years. The following table shows the several rates for the eight years 1883 (the erection of the buildings) to 1890.

Great Wild Street Block.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	Average for eight years, 1883-1890.
Birth-rate	46·4	46·0	53·8	43·8	44·3	41·4	46·6	39·8	45·2
Death-rate	32·2	22·6	24·0	21·5	15·7	14·7	16·0	15·3	20·0
Zymotic death rate	7·0	4·7	4·1	8·3	6·1	1·4	4·8	3·4	4·9

B. Little Coram Street Block.—Consists of eight blocks lettered A to H respectively: Area in square feet—(1) Ground within which the building stands, 54 500; (2) the dwelling itself, 18,600; persons to an acre, 674. The number of occupants in 1890 was 831; of these 148 were children under 5 years. The table below shows the several rates for the six years 1885-1890.

Little Coram Street Block.	1885	1886.	1887.	1888.	1889.	1890.	Average for Six Years, 1885-1890.
Birth-rate	39·0	53·6	45·8	43·1	48·5	42·1	45·3
Death-rate	13·6	18·2	24·1	20·3	17·7	19·2	18·6
Zymotic death-rate	2·4	8·5	6·0	4·7	7·1	3·6	5·3

II. Model buildings belonging to the Central London Dwellings Improvement Company, and the Holland and Thurston block, situated in Newton Street, High Holborn, W.C.—Consists of 2 blocks and 61 tenements, inhabited by 128 adults and 101 children. The birth-rate for 1890 equalled 45 7 per 1,000; the death-rate for 1890 equalled 36·5 per 1,000. There were only two deaths from zymotic diseases.

III. Model buildings, belonging to the Incorporated Society for Improving the Condition of the Working Classes; and the Streatham Street Model Buildings, situated in Streatham Street, Bloomsbury, W.C.—Two hundred and seventeen persons reside in these buildings. Of these 66 are children under 10 years of age. There were only 2 births during the past year, and 4 deaths, 1 adult and 3 infants; only one from infectious disease.

The Sanitary Staff will also be in readiness to show: the Public Mortuary, Post-mortem Room, and Coroner's Court, in Goldsmith Street, Drury Lane, W.C.; and the Master will be pleased for Members to inspect the Workhouse, Broad Street, St. Giles, W.C.

THE COLLEGE OF STATE MEDICINE, 101, GREAT RUSSELL STREET, W.C.

By Surgeon-General Cornish, Honorary Secretary.

This institution was founded in 1886, and incorporated in 1887. It owes its origin to the fact that several officials in the public services, who had great practical experience in connection with the health of the navy, army, and public services in India and the Colonies, were extremely dissatisfied with the acquirements in hygiene of the medical men entering the various medical departments. Until quite recently there was no public test by which the qualifications of medical officers as hygienists could be ascertained, and at the time of the formation of the College of State Medicine only a very limited number of the medical schools of Great Britain professed to give any instruction in hygiene and public health. It was therefore determined, after careful consultation, to establish a new institution, not in rivalry to existing medical educational establishments, but to afford to medical practitioners desirous of qualifying as health officers every facility for the practical and scientific study of those subjects which would demand their practical attention as medical officers of health.

In considering the measures necessary to the foundation of such an institution, it was deemed advisable to apply to the Board of Trade for a certificate of incorporation under the Limited Liability Act, whereby institutions working without a view to profit are enabled to register without the use of the word "Limited."

This was accordingly done, and the sanction of the Board of Trade obtained. The following are the objects set forth in the articles of association.

A. To found, establish, and maintain in or near London, an institution to aid the theoretical and practical investigation and study of sanitary science and of all matters relating thereto.

B. To aid the theoretical and practical investigation and study of other branches of State medicine.

C. With a view to effecting these objects to appoint professors, to institute lectures and demonstrations, to issue publications of the transactions of the association, to found chemical and pathological laboratories and a library.

D. To do all such things as may be incidental or conducive to the attainment of the objects above set forth, or any of them.

The administration of the College is in the hands of a Council of eminent men, a list of whom is given below. The articles of association provide for the retirement periodically and election of members of Council. In 1889 His Royal Highness the Prince of Wales was pleased to express his approval of the College, and to accept the office of President thereof.

The members of the College are of two classes, viz., Fellows and Associates. In regard to Fellows, it is laid down in the rules that "All Fellows shall be elected by the Council from such persons as are eminently distinguished in the cause of State medicine, or any branch thereof." This rule has not, so far, been acted upon, and the only Fellows are the eight original founders of the Institution. But the Council are now prepared to receive and consider applications from eminent sanitary officials at home and abroad, who would wish to connect themselves with the College. The distinction of Fellow of the College is intended to be an honorary recognition of good work, either in theoretical or practical branches of State medicine.

The qualifications for Associate of the College are the possession of a degree or certificate in public health or sanitary science, and the recommendation of two members of the Council. About seventy gentlemen have already been elected "Associates" of the College, many of whom are holding high positions in the sanitary service of the country at home and abroad.

Associates pay a fee of five guineas, and are entitled to use the library, to carry on original work on reduced fees, and to receive any publications of the College free of charge.

The College was established in rented rooms in King William Street, Strand, but it soon became evident that room was wanted for laboratories and teaching facilities. Thanks to the assistance of the Trustees of the estate of the late R. Berridge, Esq., a gentleman who bequeathed a large sum of money to be devoted to education in sanitary and social subjects, the Council were enabled, in 1889, to move into the commodious premises, 101, Great Russell Street, where the work of the College is now carried on.

This work is divided into—

1. Occasional lectures by men of eminence in various branches of State Medicine; and

2. Systematic instruction in all branches of Hygiene and Public Health, to meet the requirements of examining bodies.

Classes are formed in April and October of each year, and special studies either in bacteriology public health can be given at any time.

In addition to the instruction classes in bacteriology and public health, any gentleman qualified to pursue original investigation in either laboratory is encouraged to do so by the charge of a nominal fee to cover the cost of material.

Pails are distributed throughout the district, and generally their contents are emptied daily into carts to be conveyed to the destructor in Wentworth Street. Here, after being treated in the furnaces, the refuse becomes converted into a clinker which is inodorous, harmless, and even useful.

To quote from Mr. W. La Rivière, the Board's surveyor: "The level of the site is in two gradients, one up to the top of destructor furnaces, the other down to the stoke-holes. The carts of refuse ascend the high level, and discharge into th furnaces, and the residuum of clinker is taken at the lower level and carted away.

"The destructor consists of cells placed back group
back in pairs; these have been constructed, be met
the two best descriptions of materials which c (hum-
be obtained, with the view to ascertaining w arning
will stand the expansion and contraction the stitu-
as also to compare the wear and tear of each. alysis,
pro-
sis of

"There is an underground flue from the dest ures,
to the shaft. It is 7 feet high and 4 fe best
connecting the former with the latter, struc-
this the products of combustion travel, the are
shaft, the distance being about 300 feet.

"The brickwork of the furnaces is with of
of the walls of adjacent dwelling-hou (b)
causing the least inconvenience. Not in
the intense heat inside the furnaces, of
can be held without danger on any ext the
of the structure." No

A mortuary is in process of erection acting
tain a coroner's court, and also comn make
rooms. In the plans are included and
dead of infectious diseases, and in work in
vision has been made in conform space
rites. them-

A novel feature in the mortuar they
introduction of well-ventilated
contain one coffin. This arran the micro-
of space, and it precludes all himself
into the room of emanation He learns
The whole of the rooms hydrates,
iron columns and girders combus-
crete. milk, using

Amongst other places of by a Soxhlet
educational provision for acids, and
grounds are scattered thr Koettstorfer,
and by

Whitechapel has tak and also by
Libraries Act, and the ometer.
baths and wash-hou by accompanying
of to the fullest extent. and seeing bad,

Dr. Loane, the medi is also studied at the
chapel, will be happy and exhibits in
Congress to view taught the use of
may desire to inv The class are taken
processes, destructors,

The Dinner Society.—The Medical Society takes place in the Restaurant on will, we under Paris; Sir D. Professor Cor Morris, the Pr Edinburgh members of tinguished sentative

an opportunity of
and studying how
reduces the evil.
kinds of calculat-
and the machines them-

llection of
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Glaister,
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TF

E.

rofessor Stuart, the students have had
in studying the unrivalled patho-
Royal College of Surgeons.

—Professor Klein gives special lec-
by the oxy-hydrogen lamp. There is
bacteriological laboratory available for
the original investigator.

of State Medicine has been estab-
with the view of making money, but to
acknowledged want in the sanitary training of
health officers of the country. It has re-
no pecuniary help, except in the one instance referred to. In its working it is very nearly self-supporting, but the Council would desire to extend its operations, and especially to do something in the encouragement of the study of forensic medicine, mental disease, and other important branches of State medicine, and to found scholarships in bacteriological and chemical inquiry—work they would gladly undertake if the public, in whose interests such work is suggested, would contribute to the support of the college. It is to be remembered that the College of State Medicine is not intended for ordinary medical education, but as a post-graduate institution in which medical men devoting themselves to the great field of preventive medicine can study their subjects theoretically and practically in a complete manner, and in this respect is already recognised by the great majority of the examining bodies in public health.

The following list includes the members of Council:—

President—H.R.H. the Prince of Wales.

Chairman of Council—Sir Joseph Fayrer, M.D., K C.S.I., LL.D., F.R.S. Lond. and Edin., Hon. Physician to H.M. the Queen and to H.R.H. the Prince of Wales; Physician to the Secretary of State for India in Council; President Medical Board, India Office.

Council.

His Grace the Duke of Northumberland, K.G., President of the Sanitary Institute, etc.

James Bell, Esq., Ph.D., D Sc., F.R.S., President of the Institute of Chemistry of Great Britain and Ireland; Principal Chemist, Somerset House.

A. Wynter Blyth, Esq., M.R.C.S., Barrister-at-Law, Medical Officer of Health, Marylebone, etc.; Professor of Hygiene and Public Health.

G. T. Brown, Esq., C.B., Professional Officer, Agricultural Department, H.M. Privy Council; and Principal, Royal Veterinary College.

Sir James Crichton Browne, M.D., LL.D., F.R.S., Lord Chancellor's Visitor in Lunacy.

Geo. Buchanan, Esq., M.D., F.R.S., Medical Officer, Her Majesty's Local Government Board; Member of Senate, University of London.

Major-General Sir Redvers Buller, K.C.B., K.C.M.G., Quartermaster-General of the Forces; Member of Army Sanitary Commission.

Robert Brudenell Carter, Esq., F.R C.S., Member of the General Medical Council; late Hunterian Professor of Surgery and Pathology, Royal College of Surgeons, England, etc.

Surgeon-General William Robert Cornish, C.I.E., F.R.C.S., Fellow of Madras University, Hon. Physician to Her Majesty the Queen; late Sanitary Commissioner to the Government of Madras; and Member of the Legislative Council, Fort St. George.

Sir Thomas Crawford, M.D., K.C.B., LL.D, Hon. Surgeon to Her Majesty the Queen; Director-General, Army Medical Department.

J. N. Dick, Esq., C.B., Director-General, Medical Department, Royal Navy.

G. Fleming, C.B., LL.D., Principal Veterinary Surgeon to H.M. Army.

Sir Wm. Guyer Hunter, M.D., K.C.M.G., M.P., Hon. Surgeon to Her Majesty the Queen; late Vice-Chancellor, University of Bombay; Surgeon-General, Indian Medical Department.

Edward E. Klein, Esq., M.D., F.R.S., Professor of Bacteriology to the College.

Sir Douglas Maclagan, M.D., V P.R.S. Edin., Professor of Medical Jurisprudence and Hygiene, University of Edinburgh; President, Royal College of Physicians, Edinburgh.

Arthur Trehern Norton, Esq., F R.C.S., Surgeon Commandant, Volunteer Medical Staff Corps, etc.

J. Lane Notter, Esq., M.D., Surgeon-Major, A.M S.; Professor of Hygiene to the Army Medical School, Netley.

Sir George Edward Paget, M.D., K.C.B., D.C.L., etc., Regius Professor of Physic, University of Cambridge.

Richard Quain, Esq., M D., F.R.S., F.R.C.P., Consulting Physician to the Hospital for Consumption and Diseases of the Chest, Brompton; Treasurer, General Medical Council.

Sir John Watt Reid, M.D., K.C B., LL.D., Hon. Physician to Her Majesty the Queen; late Director-General, Naval Medical Department.

Sir Henry Roscoe, M.P., LL.D., F.R S., late Professor of Chemistry in the Victoria University, Owens College, Manchester.

J. Burdon Sanderson, Esq., M.D., LL.D., F.R.S., Waynflete Professor of Physiology, University of Oxford.

William Robert Smith, M.D., D.Sc., F.R.S.Edin., Barrister-at-Law.

Hon. Secretary and Treasurer—Surgeon-General W. R. Cornish, C.I.E., F.R.C.S., Honorary Physician to the Queen, etc.

The laboratories of the College will be open to inspection of the members of the Congress on presentation of their cards of membership from 10 to 4 p.m.

A SHORT ACCOUNT OF THE WHITEHALL PUBLIC UNDERGROUND CONVENIENCE.

By G. R. Wheeler, Esq., Surveyor to St. Mary and St. John, Westminster.

The above was constructed by this vestry to fulfil a long-felt want in this district, being situated in Whitehall, opposite the Home Office. It is constructed entirely under the roadway, with the exception of the staircases, at each end, round which are formed refuges. The building is 50 feet in length by about 10 feet in breadth, and 8 feet from the floor to the apex. The roof of the arch is asphalted outside to prevent any damp from permeating through the brickwork. The inside is faced with white enamelled bricks; it gets a thorough ventilation by means of the staircases at the ends; it contains twelve urinals, nine water-closets, and two lavatories; there is an attendant's box and store-room under the stairs. The urinal divisions and backs are of polished marble, and all doors and closet divisions are of polished pine wood. The closet doors work automatically, so by placing a penny in a slot the door opens. The convenience was built and fitted up by Messrs. B. Finch and Co., Lambeth, at a cost of £1,200; was opened last March, since which time it has given complete satisfaction.

ON PUBLIC CONVENIENCES IN THE METROPOLIS.

By George Margerison,
Delegate of the St. Marylebone Vestry.

Among the many improvements—from a sanitary point of view—that have of late years taken place in London, there are few that have contributed so much to the well-being and comfort of the travelling public, as the noticeable increase in the number and in the general utility of public conveniences.

Although the necessity of providing such accommodation has always been recognized, no other matter has given vestries and public bodies more anxious thought or awakened more active opposition. But recently the authorities of St. James's were forced to pull down a structure they had erected in consequence of the inhabitants in the vicinity having appealed to the Courts of Law and obtained an injunction to that effect, although in this particular place such accommodation was required, alike in the interests of decency and health. Some allowance may be made for the objections to these buildings hitherto, on the ground that their general appearance was not attractive and their surroundings at times not always unobjectionable.

Happily a way out of the difficulty has arisen. The bright thought occurred to some minds to place these structures below ground, thus at once taking away much of the former objection and at the same time enabling the authorities to make those places more commodious, more useful, more elegant.

When one calls to mind the condition of things that recently existed in London as to public conveniences—the scant accommodation, the limited number, the insanitary condition, the oft-times repulsive appearance of such as were then in existence—and compares them with the present structures, with their tessellated pavements, their marble fittings, their automatic flush of water, their sanitary closets, their perfect cleanliness, one cannot but be profoundly grateful that the ruling bodies of the metropolis have had the public spirit and such a keen appreciation of public needs, to construct the ample and enlarged conveniences now to be found in many parts of London.

It may be noted that in the Public Health Bill which comes into operation on January 1st next, the sub-soil, for the purpose of underground conveniences, is vested in the hands of the vestries, thus doing away with the necessity that at present exists of asking the adjoining freeholders to grant permission for the erection of such structures. A special feature in the accommodation now being provided is that the claims of women to be thought of, is at last receiving consideration in many quarters. The Vestry of St. James's, in the splendid edifice they have erected at Piccadilly Circus, provide a department for women as well as men. The Board of Works for St. Saviour's District, the Vestry of St. George the Martyr, have made similar provision. St. Marylebone Vestry are about to construct two large conveniences where accommodation will be arranged for both sexes. The City of London have this matter also under their consideration. It is hoped, therefore, that ere long this reproach to our civilisation will be rolled away, by having in all convenient places public accommodation for women and children as well as for men.

Among the first—if not the first—to avail themselves of this new phase in modern sanitary arrangements, were the City authorities, who early in 1885 opened a large convenience opposite the Royal Exchange, and since then have constructed several in various parts of the City. It was not long before other vestries and district boards followed in the same direction—St. James's, St. Pancras, Paddington, Hammersmith, Chelsea, Westminster, have already contributed a quota towards public requirements.

In many conveniences recently constructed, lavatory accommodation has been provided, and as the public have largely availed themselves of its advantages, no doubt similar arrangements will be placed in all conveniences.

The following table gives information as to position, cost, etc., of some of the conveniences already opened to the public:—

Position.	Cost.	When opened.	Receipts, 1890.	Expenditure, 1890	Number of Attendances.
	£		£	£	
*Royal Exchange, E.C.	3,025	1885	...	...	...
*Eastcheap, E.C.	1,236	1886	...	...	...
*Farringdon Street, E.C.......	1,467	1886	...	...	...
*New Bridge Street, E.C.......	1,547	1888	...	...	...
Piccadilly Circus, W.	3,620	1889	1,619	566	379,742
High St., Camden Town, N.W.	1,217	1890	170	152	40,800
Broadway, Hammersmith, W.	956	1890	145	142	31,362
Sloane Square, S.W.	990	1890	113	...	27,120
Whitehall, S.W....................	1,247	1891	...	...	...
Paddington Green, W.	596	1890	†50	†50	†12 050
Southwark Street, S.E..........	...	...	376	287	105,000
St. George's Road, S.E.	...	...	303	217	72,720

All the above, with the exception of Southwark Street and St. George's Road, are constructed underground.

Provision for women is made at Piccadilly Circus, Southwark Street, and St. George's Road, and it is interesting to note, as showing the necessity for such provision, that in the numbers as stated above the attendance of women at

Piccadilly Circus is 164,275,
Southwark Street is 30,700,
St. George's Road is 11,760.

As a rule, the conveniences are open from 7 a.m. to 12 at midnight, on Sundays 9 a.m. to 12 at midnight, and are under the care of one or two attendants.

A charge of 1d. is made for use of closet, and 1d. or 2d. for use of lavatory; each person being supplied with a clean towel.

At St. George's Road the fee for closet accommodation has been reduced in the women's department to a halfpenny, and it is worthy of comment—as a reason why such convenience should be provided at the lowest reasonable charge—there has been a considerable increase in the attendances.

The public parks under the control of the Crown—that is, Regent's Park and Hyde Park—are as yet far behind the times; the accommodation for men being of a most primitive kind, and somewhat repulsive to a person of any refinement, whilst the consideration shown for women is so utterly wanting, that the meagre arrangements made for them are scarcely of any avail.

The London County Council have shown their desire for public interests in this direction, and in 1889 addressed a circular letter to the vestries calling attention to the want of accommodation, and recommending that steps should be taken to remedy this want. The Council have in the various parks under their management provided conveniences, which, though gratefully accepted, might, it is thought, in some cases be improved with advantage.

It is gratifying to know that the public largely take advantage of these modern arrangements, and it is therefore evident that the demand for such accommodation is great, and is increasing; and that the action of the ruling bodies in thus ministering to the public good is highly appreciated.

Doubtless many of the foreign delegates interested in sanitary matters, will make a point of visiting some of these conveniences. It is hoped that they will carefully note what they think is lacking in the arrangements—that they will suggest what they consider would be an improvement—so that the metropolis in this, as also in other ways, will derive much advantage from our foreign friends at the Congress of Hygiene and Demography.

The Sanitary State of Cardiff.—In Dr. Walford's recent annual report on the health of Cardiff, he states that:—Your inspectors have exercised a strict supervision over the courts, lanes and alleys occupied by the poorest class of people. Great difficulty has at all times been experienced in dealing with these places, which unless continually inspected are apt to become dirty and a nuisance to the neighbourhood. Notwithstanding much discouragement however, a great deal has been done to improve the sanitary condition of some of our courts, more especially as regards closet accommodation. In some instances, owners have, at my suggestion, substituted the well-known "Trough Closets" for the old and defective apparatus formerly in use. These closets which are most efficient in every way are so strongly constructed that it is almost impossible that they should get out of order, and their working forms a most favourable contrast to that of the "Old Hopperpan System," where only irregular hand-flushing was possible. During the past few years some of these courts have been removed in order to make room for new business premises, but it may be well to remind you, that there are still about forty of these places in the borough, that some of them are so situated that improvement is impossible, and for which demolition is the only remedy. Courts hemmed in on all sides, so constructed back to back that light and ventilation cannot be obtained (containing in some cases houses enclosed on three sides), and having a totally insufficient air space in front, with such imperfect and insufficient closet accommodation that contamination of the air of the dwellings must necessarily take place. It was in these places that in former years typhus fever and cholera were frequent visitors. It is true that most of the courts in the town are small, and contain few houses, and that they are not overcrowded to any great extent, and that in this respect they probably compare favourably with the courts of many larger towns, yet some exhibit such gross sanitary defects as to render them in my opinion entirely unfit for habitation.

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* The total amount received from all the public conveniences in the City during the past year is £1,867 10s. 9d., showing an aggregate of 448 209 attendances.

† For six months.

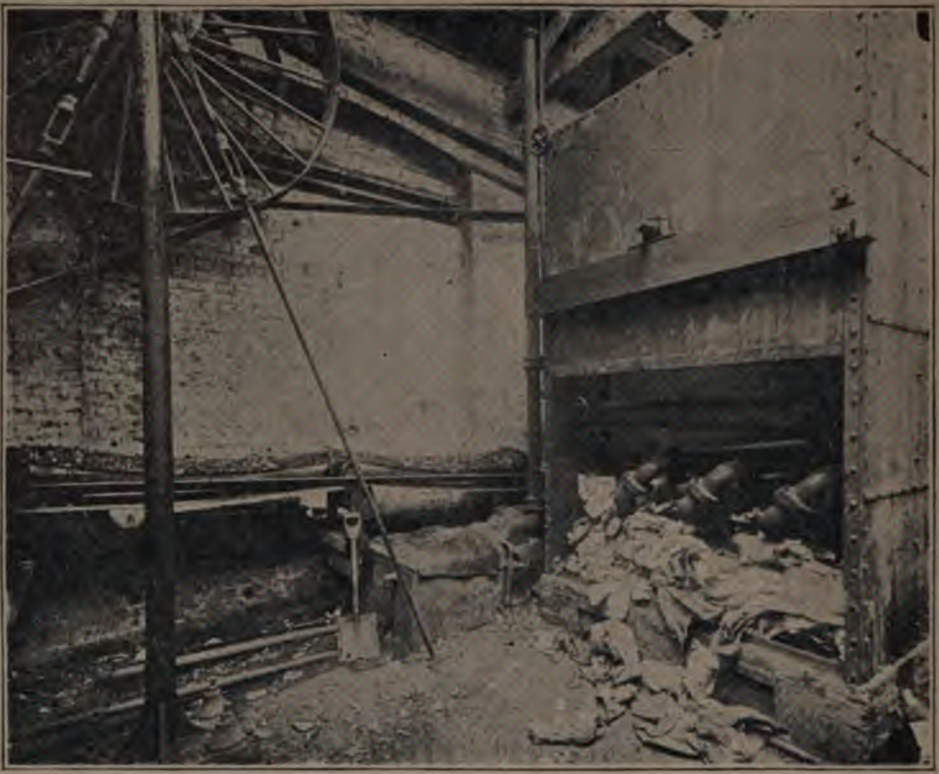


FIG. II. H Ashes and Breeze. G Drying Oven for Paper

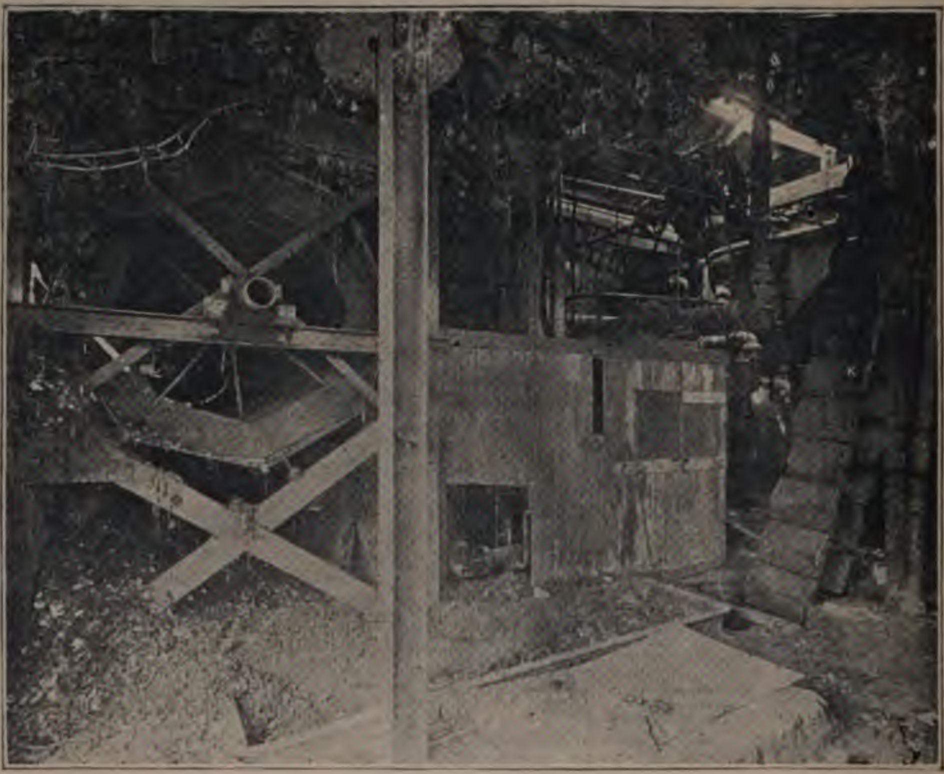


Fig. III. K *Elevator for* Delivering Ashes and Breese to the Steam Boiler. J Revolving Screen for separating the fine Manure Dust from the Ashes and Breese.

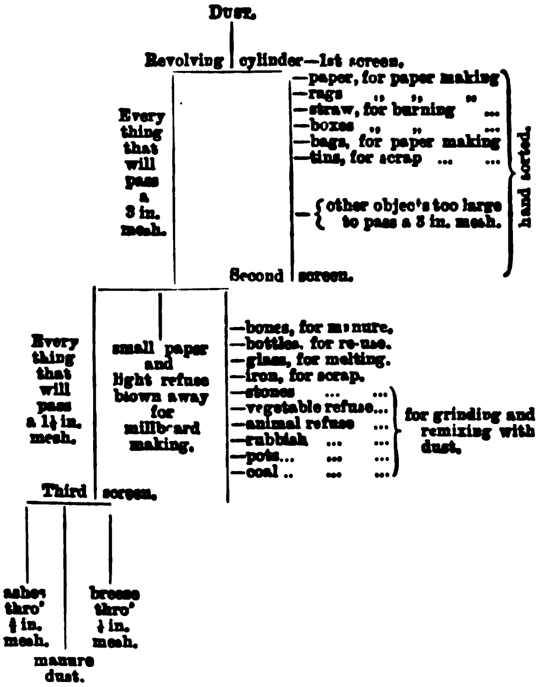
A NEW METHOD OF DUST DISPOSAL.

THE REFUSE DISPOSAL COMPANY (LIMITED), SALOPIAN WHARF, LOT'S ROAD, CHELSEA.

THE process is the invention of Mr. Joseph Russell, of Messrs. Rosser and Russell (Limited), engineers, 22, Charing Cross, and Mr. J. C. Stanley. The dust is dealt with immediately it arrives; during the whole time it is under treatment it is kept in motion, and is fully exposed to the air in thin layers. It is tipped from the cart into the first machine, and immediately commences its passage through the various sorting devices; in a few moments it has been divided into its different constituents, while all that is offensive has been intimately ground up with other material, mostly carbon, in which it is not only lost, but deodorized. The breeze and ashes are sold to brickmakers, or by mixing them with pitch they can be pressed into briquettes and used for the production of steam. One of the latest ideas of Mr. Stanley is that the steam might be utilized, as in New York, by carrying it in pipes packed in silicated cotton to warm public and private buildings. The liquid pitch of the briquettes encloses any objectionable elements they may contain, and the result is that they are inodorous. Another material of value found among dust is paper. Immense quantities of this are collected, and can be used over again for the manufacture of common brown paper for wrapping parcels. After being dried to remove the dust, and passed through the beaters to reduce it to pulp, it becomes clean and sweet. Straw can be similarly utilized for straw boards.

The refuse sorting is almost entirely mechanical; nine-tenths of the material is never touched by hand (see illustration). The dust carts deliver their loads into a revolving cylinder 10 ft. diam. by 12 ft. long. This cylinder is made of iron ribs placed about 10 in. apart, upon which are fixed wooden bars, between each of which is an opening of 2½ in. wide, so that anything less than 10 in. by 2½ in. will pass through. The wood is used to prevent bottles from being broken. The cylinder is supported on friction wheels, and is driven by external gear. It has no internal spindle or arms, as these would catch the materials and clog the working. It has a tilt of about 9 in. in its length. There is a worm carried round the inner surface of the cylinder, with an interspace of 2 ft. 6 in. for the purpose of assisting the material in travelling through the cylinder. Thus, material thrown in from the dust cart will pass out at the further end in from two-and-a-half to three minutes. The material which does not drop through the meshes of the cylinder is taken out and sorted by hand as it arrives at the further end, consisting chiefly of cardboard boxes, bottles, fuel, tin boxes, clothes, and other various matters; these are all sorted into separate baskets, the vegetable and animal refuse being taken to a mill to be ground. The material which falls through the first screen passes into a second screen, which consists of a cylinder of iron, 8 ft. diameter, 16 ft. long, covered with wirework having a mesh of 1¼ in. square. This cylinder is also supported on friction wheels, and driven by external gearing, and is provided with a worm to carry the materials which do not fall through the meshes from one end to the other. This material, as it falls from the end of the second cylinder, is met by a powerful blast of air which blows the paper away from the heavier material into an iron chest, where it is subjected to heat from the exhaust steam which is passed through pipes in the chest. The other heavier material is raised by an elevator into a slide placed at such an angle as to regulate its descent on to an iron horizontal plate or table which is constantly revolving, and which brings the material to a series of boys sitting round, who sort what lies on it. Thus coal is all saved; so is iron and metal, also boots and shoes, whilst nondescript material, such as bread, vegetable, and animal refuse, broken crockery, etc., is all taken to the grinding mill and ground up with similar refuse from the first cylinder. The material which drops through the second cylinder or screen is delivered by an endless band into a third cylinder or screen, also of iron, 6 ft. in diameter and 15 ft. long, covered with wire-work having a mesh of ¼ of an inch. This cylinder is also furnished with a worm. What passes through this mesh is called fine ash, and is sold to brickmakers. The refuse which is delivered at the end of this third screen, and has not passed through the ¼ in. mesh, but has passed 1¼ in. mesh, forms the fuel for working the engines for the operation, and also is sold as fuel for brickmakers. This latter refuse contains much vegetable matter.

This process may be best traced by means of the following scheme:—



It would appear, from statements made as to the quantity required under the boiler, that its value was about 1-7th that of coal; but its heating power is much increased by washing, which removes potato peelings and other vegetable refuse; and, indeed, part of the process is to expose the material to a stream of water which carries off the lighter organic matter. The dust, which is occasioned by the process of working in the cylinders and in the spaces below them, is removed by a powerful exhaust acting through apertures which open into the centre of the cylinders and into the other spaces where the movement of the material generates dust. The exhaust carries the dust through the fire which is under the boiler. By this means the operators are relieved from exposure to the dust caused by the operations. A market is found for all the sorted refuse, and the ground-up material from the mill is sold to manufacturers of manure. The paper, after it has been dried and disinfected by heat, is sorted and freed from dust, and is then pulped for conversion on the premises into brown paper or cardboard. The dust which is drawn by the exhaust from the cylinder and from the paper chest, and from other parts, is all drawn through the boiler fire, the accelerated draught of which assists the combustion of the vegetable refuse in the breeze, and enables the gases from the fire to be passed through a scrubber with water spray so as to prevent offensive odours.

The works are lighted by electric light, generated by the fuel obtained in these operations, and it is the ambition of the Company to utilize the contents of the dustbins to illuminate the Metropolis.

Health Receptions under the Patronage of H.R.H. Princess Christian.—The president and committee of the London Vegetarian Society and the Council of the Bread and Food Reform League have arranged to hold a series of receptions on August 12th, 13th, and 14th, from three p.m. to ten p.m., at the Memorial Hall, Farringdon Street (near Ludgate Circus). The opening ceremony will take place on Wednesday next at four p m. The Hall will be beautifully decorated. There will be exhibits illustrative of hygiene and of food. Cookery demonstrations by children from the London School Board and others: music, recitations, singing, etc. All members of the Congress are invited to attend and will be admitted on presentation of their congress ticket.

Local Authorities as Subscribers to the Congress.—£600 in sums varying from £1 1s. up to £100 have been subscribed by the following forty-nine Local Sanitary Authorities:—Glasgow, Edinburgh, Newcastle, Brighton, Dundee, Manchester, Salford, Bournemouth, Leeds, Southampton, Cardiff, Swansea, Bootle, Devonport, Nottingham, Chester, Colchester, Derby, Wallingford, Exeter, Middlesborough, Hanley, Bristol, Carlisle, Cheltenham, West Hartlepool, Crewe, Stockton, Hornsey, Newport, Oxford, Ryde, Ealing, Middleton, Barrow-in-Furness, Sleaford, Selkirk, Huntingdon, Nalybridge, Halifax, Kidderminster, Peterborough, Walton-le-Dale, Eastbourne, Battersea, Chelsea, St. Luke's, West Ham, and St. Marylebone. It will be noted that only four local bodies in the Metropolis subscribed; the subscriptions of the four altogether amount to the small sum of £25.

The "Cone" Air-inlet Valve. Rd. 168,133.—1891.—This valve is a new and apparently reliable air-inlet. Its narrow-coned neck increases the velocity of fresh air through the drains on the same principle as Ellison's conical bricks, and the smallness of the talc valve effectually prevents any return of foul air reversed by the discharge of water through the drains. There is also an advantage in the absence of corners for the collection of dirt. The price, galvanized with brass cone front, is 10s. 6d. each, which is somewhat less than other air-inlets. The patentees and makers are T. Durrans and Sons, sanitary engineers, 43 and 44, Upper Baker Street, London, N. W.

OBITUARY.

MR. C. F. J. LORD.

TO THE EDITOR OF PUBLIC HEALTH.

Many of the old friends and colleagues of the late Mr. C. F. J. Lord will be sorry to hear of his death, which took place, in his 80th year, on July 10th, at Doughty Street, Mecklenburgh Square. Mr. Lord was born in 1804, and was the son of a rector who for many years held a living in Cornwall. He received a good classical education, and about 1822 entered as a student at Guy's and St. Thomas' Hospital, taking his degree in 1826. In 1827 he commenced practice in Hampstead, and soon after received the appointment of poor law medical officer. Tall and handsome, and of striking appearance, he soon formed a large practice, at the same time taking a great interest in all parochial matters, especially in the subject of poor law medical relief, upon which question he published a pamphlet. The state of the dwellings of the poor in some of the courts and alleys of Hampstead aroused his indignation, and in a powerful letter to the Lord of the Manor he drew a startling picture of their defects and abominations; water, drainage, and ventilation were in these uncared for courts practically unknown.

When by the law of 1855 the office of Medical Officer of Health was created, he was marked out as well fitted for the work, and for twenty-two years he filled the post of Medical Officer of Health for the parish of Hampstead with credit, retiring in 1879, when he received a pension from the vestry, an additional ten years being added to his length of service.

He was one of the earliest members of the Society of Medical Officers of Health, and was also a steady supporter of cremation, being one of the first members of the society founded to further that practice.

Of great originality and independence of character, his outspoken opinions did not always meet with approval, and even occasionally created difficulties for himself. Fresh and piquant in his style, he was liable to be misunderstood, and upon one occasion a quotation in one of his reports, taken from the Old Testament, was resented by a member of the vestry, who complained that their Medical Officer was calling them all "dumb dogs who could not bite." In later years his manner became somewhat abrupt and rugged, but he could when he wished assume a very courtly and dignified tone. A brilliant conversationalist, and a good listener, he was popular in society, and was on terms of friendship with many leading men of his day. After giving up practice he endeavoured to escape the rigours of the English climate by passing the winters in Spain, Algiers, and the Cape of Good Hope.

His intellectual activity in his old age was remarkable, and although deprived of sight for the last five years he still maintained a vivid interest in science.

In accordance with his wishes his remains were cremated at Woking on July 14th in presence of his relatives. E. Gwynn,

Medical Officer of Health for Hampstead.

Cleansing the Sewers of Warsaw.—M. Emil Sokal has invented an apparatus for the purpose of clearing away the sludge in the sewers of Warsaw when flushing is inapplicable. The device consists of a wooden template or mould, fitted to the profile of the sewer, and resting on a batten of 1¼ in. thick, pointed at the end for the purpose of penetrating and loosening the sludge. The flushing sluice above the portion of the sewer to be cleaned is closed, and water allowed to accumulate. About 6 ft. or 10 ft. lower down the template with the pointed scraper is set up; the sluice is now opened, and the scraper, which is under the control of a workman, moves on and clears the deposit. If this be very solid and hard, a small shutter in the template is opened, and water, sufficient to thin it, is admitted, or the scraper may be taken over the same ground as often as necessary.

PUBLIC HEALTH,

THE OFFICIAL ORGAN of the CONGRESS of HYGIENE and DEMOGRAPHY, 1891,

AND

The Journal of the Society of Medical Officers of Health.

THE OPENING OF THE CONGRESS.—MEETING AT ST. JAMES'S HALL.

Never have so many eminent hygienists from all countries collected in one meeting as at the opening meeting held yesterday, August 10th. There were no less than 2 300 persons. On the platform were His Royal Highness the Prince of Wales, Sir Douglas and Lady Galton, Dr. Poore, the Secretary General, Dr. Corfield, Foreign Secretary, T. Cutler, Sir W. Wedderburn, White Wallis and Mrs. Wallis, Ernest Turner and Mrs. Turner, Dr. J. F. Sykes and Mrs. Sykes, Dr. W. R. Smith, Dr. Seaton, Henry Robinson, Esq., Grainger Stewart, General A. M. C. Scott, Mr. Letheby, F. Fry, H. Hill, Major Post, Sir W. MacCormac, Earl of Feversham, Dr. W. Ogle, Archdeacon Farrar, Dr. Mapother, Dr. Longstaff, Dr. Hector, Dr. Cameron, M.P., Hon. R. Russell, Sir H. Thompson, the Greek Ambassador, Sir C. and Lady Cameron, Dr. W. and Mrs. Pasteur, Mr. Gordon Smith and Mrs. Gordon Smith, Dr. Hermann Fieber, Mr. Francis and Mrs. Galton, Sir R. and Lady Quain, Dr. and Madame Brouardel, Dr. Roth, Professor Körösi, Professor Corradi, Dr. George and Mrs. Buchanan, Dr. and Mrs. Duka, Major-General Marston and Mrs. Marston, Sir R. Rawlinson, Mr. Ernest and Mrs. Hart, the President of the British Medical Association, Dr. Russell Reynolds, Sir F. Abel, K.C B., Herr F. Ritter von Grüber, Professor Frankland and Mrs. Frankland, David Finlay, Mr. W. R. E. Coles, Professor G. T. Brown, Mr. Ernest Clarke, Sir W. Macalister, Mr. Makins, F. Fowke, Mr. Furley and Lady, Sir W. MacCormac, Sir Owen Burne, G. Berkeley, Esq., Sir Dyce Duckworth, Sir Douglas and Miss Maclagan, Sir T. Crawford, Insp.-Gen. Lawson, Professor Erichsen, T. Holmes, Sir Andrew and Lady Clark, Mr. and Mrs. Bryant, Mr. and Lady Burdett-Coutts, Lord Mayor and Lady Mayoress, Malcolm and Mrs. Morris, Mr. and Mrs. Shirley Murphy, Dr. and Mrs. Priestley, Sir Augustus Harris, Sir W. Farmer, Sir H. Ackland, Sir Ed. and Lady Galsworthy, Sir Donald Currie, Dr. Langdon Down and Mrs. Langdon Down, Sir T. Sutherland, Sir Spencer and Miss Wells, Surgeon-General Cornish, Professor and Mrs. Corfield, S. Digby, Esq., Dr. and Mrs. Shelly, Sir Joseph and Lady Lister, Professor Wynter Blyth, Surgeon-General Mouat and Mrs. Mouat, Sir Joseph and Lady Fayrer, Dr. and Mrs. Thorne Thorne, Sir Nigel Kingscote, Sir Edwin and Lady Saunders, Mr. J. R. Diggle, Sir A. and Lady Blomfield and Miss Blomfield, Sir J. and Lady Coode, Sir J. and Lady Paget, Lord and Lady Wantage, Lord and Lady Basing, Von Coler, Director-General of the Prussian Army Medical Department.

Sir D. **Galton** presented the report of the Permanent International Committee as follows:—The Permanent International Committees of Hygiene and Demography, appointed at the Congress held in Vienna in 1887, beg to report that the English members entrusted with the organization of the present Congress, viz., Sir Douglas Galton, Professor Corfield, and Mr. Shirley Murphy, together with other English members of the Vienna Congress, viz., Sir Spencer Wells, Bart., Professor (now Sir George) Humphry, Dr. Charles Cameron, M.P., Professor Frankland, and Dr. Mapother, issued a letter inviting co-operation in the formation of a general committee. This committee at its first meeting elected an organising committee, of which Sir Douglas Galton was elected chairman, and Professor Corfield and Mr. Shirley Murphy honorary secretaries. A public meeting was held at the Mansion House, by the kind permission of the late Lord Mayor of London, to make the Congress more widely known, and was largely and influentially attended. A meeting of the permanent committee was held in Paris at the time of the International Exhibition in 1889, at which there were present Dr. Brouardel (chairman), Sir Douglas Galton, Professor Corfield, and Mr. Shirley Murphy, as members; and also Dr. Napias, Dr. A. J. Martin, and Dr. Mapother. Subsequently to this, His Royal Highness the Prince of Wales graciously accepted the post of President to the Congress, and presided at a meeting of the General Committee held in London, at which Professor Corfield was elected honorary foreign secretary, and Dr. G. V. Poore honorary general secretary of the Congress, Mr. Shirley Murphy having resigned his position as secretary of the Organising Committee on account of the pressing nature of his duties as medical officer of health of the London County Council. It having been left to the English committee to select representatives for Egypt and Japan on the permanent committee, they have elected Dr. H. R. Greene Pasha to represent Egypt, and Dr. Shimpei Gotoh to represent Japan. A number of additional members have also been elected to the committee for the purposes of the present Congress. The work of the Congress has been arranged in two divisions, viz., hygiene and demography, and it has been found necessary to divide the former into nine sections, each under a separate president, and with separate organisation. Committees have been organised in foreign countries to further the interests of the Congress in a more direct manner than could be done from England. Delegates have been appointed by all the Governments of Europe, and also by the United States, Mexico, Venezuela, Japan, Persia, Egypt, by the provinces and native states of the Empire of India, by the most important colonies, and also by numerous municipal authorities, universities, scientific and medical societies, and other institutions throughout the world, and large numbers of the most important authorities on the subjects to be treated of have sent communications to be laid before the Congress. The Permanent Committee have, therefore, every reason to believe that, under the presidency of your Royal Highness, the Congress will be in every way worthy of the occasion, and will contribute largely to the promotion of sanitary science in all parts of the world.

The Prince of **Wales**, who was loudly cheered on rising, said: Sir Douglas Galton, Ladies, and Gentlemen,—It gives me great pleasure to open the proceedings of this Congress, and offer a hearty greeting to all its members, especially to those whom it has induced to come from distant countries. Many as have been the meetings for good purposes over which it has been my good fortune to preside, there has very rarely, if ever, been one of which the object has been approved by a greater weight of authority. (Cheers.) The importance of our Congress is proved, not only by the large number of members who have assembled here to-day, but by the names of those who are on the list of its officers, both honorary and active. Under the Queen's patronage this list includes, together with several members of my family, some of the principal members of Her Majesty's Government, the presidents of nearly all the medical corporations, representatives of the Universities, and of the chief medical and scientific societies in the United Kingdom, delegates from nearly every great country in the world, and from all our sanitary institutions and medical schools, many official representatives of our Colonies and India, the Lord Mayor and Sheriffs of the City of London, the Masters of several of the City Companies, and a great majority of those who, here or elsewhere, have gained the highest renown in the study of public health or of the sciences most nearly allied to it. (Cheers.) All these approve the design of the Congress, and they may well do so, for in so far as its object can be fulfilled, it will everywhere bring good to all classes of society. As one looks through our programme, it is impossible not to feel distress and even horror at the multitude of dangers to health in the midst of which we have to live. Some of them appear at present to be inevitable, but the great majority may certainly with due care be averted. (Cheers.) I cannot pretend to be able to judge of many of these dangers, but I would take as examples those to which my attention was especially drawn when I was a member of the Royal Commission on the Dwellings of the Working Classes. I learned much there of the dangers to health which may be ascribed to the constant increase of our great manufactories, and to other industries, from which especially come the overcrowding of our towns, the building of huge factories, the pollution of our atmosphere, the accumulation of refuse, the fouling of rivers, the impurities of earth and air and water. I learned not only these dangers, but the immense difficulty of increasing or even maintaining our activity in all branches of trade without incurring heavy risk to health, more particularly in our chief centres of population. The task of averting them might have appeared hopeless, but I have rejoiced to see how much has already been done in diminishing them, and to observe how our registers bear witness to the decreasing mortality in our large towns, to the increasing average length of life in the whole population, and of many facts proving the good influence of our sanitary institutions. But on them I do not now propose to dwell. I will only conclude from them that the good already done, and the constantly increasing knowledge of the whole subject, may make us sure that much more good may still be attained, and that neither this nor any other nation should be content until prosperity in business and all other things desirable for the national welfare are made consistent with national good health. How the many dangers which our programme indicates may best be dealt with will of course be discussed in the several sections. It will be no trivial work if their sources and probable remedies can be clearly pointed out, and, especially if this can be done, as in a Congress such as this it should be, in a strictly scientific manner, calmly and dispassionately, without any reference to either general or municipal politics, or for any other purpose than the promotion of health. (Cheers.) It is only on conviction such as may thus be produced that the appointed sanitary authorities can compel the changes necessary to be made; for such changes are almost always inconvenient or injurious to some, and might even seem unjust to them, unless it be made quite clear that they would be very beneficial to the community. But my hope is that the work of this Congress may not be limited to the influence which it may exercise on sanitary authorities. It will have a still better influence if it will teach all people in all classes of society how much everyone may do for the improvement of the sanitary conditions among which he has to live. I say distinctly "all classes," for although the heaviest penalties of insanitary arrangements fall on the poor, who are themselves least able to prevent or bear them, yet no class is free from their dangers or sufficiently careful to avert them. Where could one find a family which has not in some of its members suffered from typhoid fever or diphtheria, or others of those illnesses which are especially called "preventable diseases"? Where is there a family in which it might not be asked, "If preventable, why not prevented?" I would add that the questions before the Congress, and in which all should take a personal interest, do not relate only to the prevention of death or of serious diseases, but to the maintenance of the conditions in which the greatest working power may be sustained. In this I include both mental and bodily power, for the highest possible prosperity must be when men and women of all classes, rich and poor alike, can safely do such good and useful work as they are fit for, and for which they are responsible to those among whom they live. To this end it is essential that they should enjoy the best possible health and vigour, and to obtain these it is necessary that everything possible should be done for the promotion and maintenance of the national health. Such then is to be your work; let me say our work, for though I cannot further contribute to the proceedings of the Congress, I shall watch them with much interest, and shall always strive to promote whatever may be here plainly shown to be useful for the public health. (Loud cheers.)

Dr. **Brouardel**: In the name of the French members of the Congress of Hygiene and Demography, I offer our respectful homage to His Royal Highness the Prince of Wales. We pray that he will convey to her Majesty the Queen of England the expression of our most heartfelt thanks. Her Majesty has graciously deigned to accord to this Congress her Royal patronage, and we hope that the work achieved by it will justify this mark of her gracious approbation. We are aware that in England public opinion is ready to second our efforts; we have a sure guarantee of this in the history of the last half-century. In the year 1837, the year of the coronation of her Gracious Majesty, appeared the Act which rendered obligatory the registration of deaths. This Act inaugurated the era of administrative reforms concerning the public health, which our valued colleague of the Local Government Board has rightly called "The Victorian Era." This Act did not long remain alone. Under the impulse given by two of your most illustrious patriots, William Farr and Edwin Chadwick, you have organised a system of registration of the causes of diseases and of deaths. Certain important cities, before the law made it obligatory, obtained supplies of water beyond all suspicion of pollution, and adopted systems of removal of foul water and waste matters. In these cities, whose action cannot be too much praised, the sickness and death rates diminished rapidly; this furnished the necessary proof it was time for reform. Twenty years ago the Local Government Board was established, and in 1875 had submitted to Parliament a Bill for the protection of the public health. During its discussion in Parliament one of your greatest Ministers (Disraeli) pronounced in the House of Commons these memorable words, which should be repeated in all countries and in all Parliaments: "The public health is the foundation on which repose the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman." Since this, each year you have made fresh improvements in your sanitary laws; if in your eyes they are not perfect, in the eyes of the nations who surround you they are an ideal towards which all their most ardent aspirations tend. It is your example they invoke when they claim from the public authorities the powers necessary to oppose epidemics, to combat the scourges which decimate their populations. You have taken the first rank in the art for formulating laws for the protection of health; this is not all that you have done in the domain of hygiene. Among the diseases which one can properly term pestilential, there are, thanks to the work of the hygienists of all countries, certain ones which from the present time may be considered as preventable: such are small-pox, typhoid fever, dysentery, and cholera. For one of these, the most terrible, the immunity conferred by vaccination is absolute. The person upon whom this immunity is conferred can pass through the most severe epidemics, and expose himself to all sources of contagion without being affected. Who is it who thus preserves from death, from blindness, from infirmity, millions of human beings of all countries and of all races? On May 18th, 1796, a date which might well be the date of a great battle, Jenner inoculated with vaccine matter by means of two superficial incisions, the youth James Phipps. Protection against small-pox belongs to you; the world will be to you for ever obliged. Let us consider two other epidemic diseases. Is it possible to establish the conditions of propagation of typhoid fever without quoting the names of Budd or of Murchison? I am aware that in 1855 Dr. Michel de Chaumont had for the town in which he lived experimentally established the rôle played by drinking-water in the propagation of this disease. Unhappily, public opinion was not prepared, and his discovery was not listened to. In the work which we are considering, the efforts of the English school were most fruitful. May I recall the fact that it was the epidemic of cholera in 1866 in England, which gave birth to the theory of its propagation by drinking water? Was it not at that date that, under the influence of your hygienists, the Lords of the Privy Council issued an order formulating the laws of prevention which we adopt to-day? Certain it is that even in England these discoveries have not immediately borne all their fruit. The anti-vaccination leagues are not yet dead. Proofs accumulated during a century have not sufficed to cure that mental blindness which is congenial. After the enthusiasm which each discovery receives come the difficulties of application, doubts, reactions. In the country of the great Harvey it is not necessary to recall the laws which govern the human mind. Has the glory of him who discovered the circulation of the blood been lessened by the rudeness of strife? Be assured that that of the English hygienists will survive present difficulties. It will survive because the benefit derived from these discoveries is international, and is not limited to a single people. We all of us praise the success of our neighbours; we know that our compatriots will find in it an advantage to their comfort, their health, and their lives. In this career there are rivals, but not enemies. But if the benefit is to all, the glory is to one alone, and that country has the right to be proud of the moral authority which the genius of her children gives her. For the last fifteen years medical doctrines, especially those most concerned with hygiene, have undergone a revolution which survives in importance all those of which history has taken notice. Can France be represented in a Congress of Hygiene without recalling the name of M. Pasteur? For centuries we have asserted that epidemic diseases were propagated by means of contact, by the air, by the effluvia, by miasmita. The idea of morbific germs, if not the name, is even found in the works of Hippocrates, but in what an uncertain sense. The theory of contagion has passed from century to century with strange modifications; the uncertainty of the methods of research and the difficulties of observation bound up together truth and error. It remained for Pasteur to prove the existence of these germs, their form, their life, their mode of action, and by their attenuation to solve the problem of immunity. Thanks to his work, and thanks to those of his pupils, realities have succeeded to contingent possibilities. We know some of our enemies, their habits, and their mode of penetrating the body; up to this time man was conquered by these infinitesimal beings, but thanks to recent discoveries he will be their conquerer. When, at the beginning of a century, one can inscribe the name of Jenner, and at its end that of Pasteur, the human race may rejoice. More has been done for it against misery, disease, and death than in any one of the centuries which have preceded it. You, gentlemen, you have been the initiators; this title will never be disputed with you. When a great people has given such an example; when, by her gracious patronage, her Majesty the Queen, and when, by his presence, his Royal Highness the Prince of Wales, testify that for them this era of reforms is not closed, it is only right that those who try to imitate them and to give their country similar institutions, should come to bring to that people, and to their Sovereign, the homage of their profound respect. Gentlemen, I will finish by addressing to the City of London our sincere thanks for the gracious reception which she has given to her guests. Thanks to you we shall bring together here an association of ideas and of men. This task will be made easy, for us by the preparations of the Organising Committee. If the success of the Congress answers, as I have no doubt that it will, to our expectations, it is to the Organising Committee that we must assign the honour. We beg Dr. Corfield, who has undertaken the severe task of conducting the foreign secretarial work of the Congress, to accept our personal thanks. Gentlemen, France hopes that the London Congress will occupy a place of honour in the lists of the Congresses of Hygiene.

Dr. VON COLER, Director-General of the Prussian Army: Charged by the German Government, especially by that of Prussia, and in the name of all those from the German Empire who with me responded to your call to the Congress, I have to offer you the warmest thanks for your kind invitation, and I need hardly add how highly I appreciate the great honour thus conferred upon me. The great number of delegates alone who have been sent from my native country to attend this Congress clearly prove the lively interest felt at home in all the future labours and deliberations of this distinguished assembly. It is indeed with a feeling of joyous pride if from this place and in this country, where we have to trace the very cradle of all modern science of public health, I am permitted to point out how the many efforts made in the direction of hygiene radiating from England were, especially in Germany, hailed with much delight, where they received the most careful attention, and where they ever since have been most actively promoted. And for all that has been done there existed good reason. Mankind has to ever struggle against, to ever resist the forces of Nature, the subjection of which is the goal of our efforts. The highest degree of culture is alone to be found where man has most perfectly subdued to his will Nature. In that formidable struggle it is hygiene which forges the most efficient weapons. Of eminent usefulness, refreshing and invigorating, is the spring that flows from every science, but so full of blessings, so advantageous to the common welfare and to individual happiness, scarcely another science exists equal to hygiene. Germany has herself gone through that experience. Yes. Could I lead you from our most magnificent palaces to the humblest homesteads of the toiler—show to you the arrangements of our metropolis and those of a lonely workman's shop—all and everywhere the observing eye would meet with valuable hygienic efforts and improvements, all serving to benefit the single individual as well as the community. The dearest to the heart of the German nation is its army, formed by the sons from all ranks of the people. And it is this grand institution which, independent of a rarely-occurring war, in times of peace and for the furtherance of peaceful purposes, has become its national school of physical and intellectual development, a source of the highest virtues of mind and body, a source of our sublimest ideals. It is in this fine national institution, where the blessings of hygienic science have abundantly been received, where the greatest success may daily be distinctly observed. We must thank, above all, hygiene and her teachings, if it has been possible to considerably lessen, from year to year, the number of patients in the army, and to reduce the number of deaths to a minimum. In the year 1888-89 alone 79,500 men applied for surgical or medical treatment below the average of the ten preceding years. Consequently many hundred thousand days of sickness which formerly had to be placed under medical treatment have now been won for better physical and intellectual education of the men. The death-rate has diminished by two-thirds in the same time (from 6·9 per cent. in 1868 to 2·3 per cent. of the present force in 1888-89), and during the last year we counted at least 1,500 deaths less than in 1868. Comparing these figures with the numerical strength of the army of the present day and of that year, what an amount of national fortune and human happiness we trace in summing up these events! Every single man, when he attains the age to serve in the army, represents a pretty fair-sized capital, which to secure in the national interest has been the successful task of hygiene, and incalculable are the beneficial consequences which lay in the fact that in every year ten thousand of our men more remain now healthy and free from the germs of disease—men who, after completing their military services, return home, peacefully settle down, and offer in their robust state of health the best guarantees of becoming fathers of a healthy rising family. Truly considered in this light, the costs for hygienic arrangements are, through the fruits they bear, more than a hundredfold repaid. If from our army diseases like malaria, small-pox, dysentery, have completely, or almost completely, disappeared, if typhus fever and diphtheria become more and more diseases of the past, we have to be thankful for these attainments to the development and application of hygiene. Under the reign of His Majesty the Emperor and King William II., who, with a truly royal heart and strong determination, secured for hygiene in our country the rightly deserved place, the most magnificent results crowned this work, results which until recently were thought to be almost impossible to attain. Proved by experience, it is now an established fact that infectious diseases are by no means a necessary evil in the army. They are simply diseases which can be avoided, which can be powerfully opposed, and against which the science of our days battles victoriously with ever-increasing success. We all fervently hope that the councils and resolutions of the Congress may lead to the advancement of science, to the happiness of men, and to the glory of this great and hospitable country.

Professor CORRADI: Your Royal Highness, Ladies, and Gentlemen,—I bring you the homage and the salutations of Italy. Ancient are the chains which bind my country with England, and science has made them more lasting. Landfranc of Pavia, and Anselm of Aosta, restored in the eleventh century learning to Canterbury, and from among the students of our universities the English nation took them. But already, Robert of Anglia was among the rectors who opened in the year 1205 our university at Vicenza, having removed from Bologna, where, a little before the Poet Gualfrido had taught literature with great success, and where a little afterwards Alano, the universal doctor, rendered famous the Chair of Canonical Law. The teachings and the discipline of the Italian schools entered with scholars become teachers, into Oxford and Cambridge, and the traditions were maintained. But if these had become chains of habit a more intimate connection followed in the sixteenth century. William Harvey reunited indissolubly in the field of science the names of the two nations by giving the demonstrations of a part of which in the Anatomical School of Pavia the fundamental principles were found, but instead of partial portions and scattered or uncertain ideas, he evolved a complete system, under which all is known in the greatest simplicity. The discovery of the circulation of the blood is the most solemn testimony that one begins great things and that another finishes them. This remarkable event signalised one of the greatest moments in the history of science, not only by the fact itself, but by the new spirit which it induces into biology, which is the foundation of hygiene. Moreover, to recall here the names of the Doctor of Folkestone, and of the hospital of St. Bartholomew, the "Stator Perpetuous" of the Royal College of Physicians of London, is to forbode well of the Seventh International Congress of Hygiene; the glory of Harvey is reflected upon his predecessors, his masters; to salute him is to salute both Italy and England, who affectionately join in celebrating his immortal name.

Dr. **Roth**: Your Royal Highness and Gentlemen,—It is with the greatest pleasure that I comply with the request to address the meeting on behalf of the German Committee for the International Congress of Hygiene. A Hygienic Congress in England is a striking event, an event in accordance with the character of the English people. In the whole field of hygiene England has been, without question, foremost in practice, and this foremost place England owes to the large number of eminent men who have devoted their powers to this subject. English sanitary institutions also owe much to the wealth of the nation, especially those which are of such a gigantic character as to astonish us. It is a peculiarity of England to conduct experimental researches on a grand scale, and thus a large amount of trouble in similar investigations is saved to other countries. In Germany we acknowledge and appreciate fully the splendid sanitary work of this country, work facilitated by the character of the English people, which, conservative as that character is, lends itself zealously to anything new, so long as it has practical value; when English people are convinced of the practical utility of a scheme, no obstacle, financial or other, deters. The sanitary institutions of England are not to be learned from books, we have to come and look for ourselves; in this way only can we become acquainted with the numerous institutions devoted to the welfare of mankind, and gain familiarity with the great questions of self government, the deficiencies of which, especially the conflicting character of some portions of local administration, must not be overlooked. We certainly study with the highest interest the sanitary institutions of England. We not alone admire practical hygiene in England, but also the progress in theory. Hygiene, indeed, flourished here at a time when the German Universities had just begun to give their attention to the subject. We are in duty bound to gratefully acknowledge the great progress in the science of hygiene due to the influence of the Netley School. Of the many eminent men who worked there, I mention one, who is no longer among us, but whose memory is dear to all who take an interest in the welfare of our soldiers, and in the science of hygiene—viz., Edmund Alexander Parkes. Until his death in 1876, his lectures attracted all those who wished to study the subject. A man of the highest faculties, with an almost womanly tenderness of heart, and the purity of a child, he was sure to make the deepest impression on his fellow-workers. A lasting monument of Parkes is his Manual of Practical Hygiene, which has become the basis of extensive hygienic work. We must not forget to mention his friend and successor de Chaumont, who proved to be his best fellow-worker, and who did some eminent work in questions of practical hygiene. On this conspicuous place I thought it right to recall the memory of these two eminent workers in our branch of science. I conclude by expressing a wish that it will be the spirit of Parkes which will guide the transactions of this Congress. Parkes' Museum was the first institution in which a practical course of hygiene was possible at the same time it shows what his ideas, his aims, were as to the generalization of hygienic knowledge. May this Congress follow his steps, and may its works tend to impart in ever-widening circles that which Parkes called the aim of his life: light and clearness.

Dr. M. **Joseph Körösi**: As a representative of demographical statistics in Austria-Hungaria, I beg to be allowed to express in a few words our sense of deep gratitude for the honour which has been bestowed upon us by the patronage of Her Majesty the Queen and by the presidency of His Royal Highness the Prince of Wales. It is not for the first time that the representatives of statistic science have been called upon to meet under the patronage of your great Queen, and to work under the protection of her illustrious throne. Thirty years have passed since the International Statistic Congress met in this hospitable town to do its fruitful work. Your place, your Royal Highness, was taken then by your illustrious father, who spoke to us those ever-memorable words of wisdom and benevolence, which have shone upon the path of statistic science ever since, and which still are gratefully remembered by us. So, while deeply moved by gratitude towards our Royal President for the interest taken in our work, we cherish in our hearts as well the memory of the illustrious deceased. But it is not to single persons only that our gratitude is due; we have to thank all England, the genius of the great English nation, for it is England whom, among all nations of the world, we must consider the mother-country of statistics, especially of Demography. This branch of science, the very nucleus of statistical work, which in fact is quite a science in its own right, has chosen the task to investigate the laws which regulate the life, increase, and decrease of nations. Its work, therefore, comprises three main parts: statistics of natality, of mortality (this part including biometry, the science of measuring the duration of human life), and of the increase of population. And when inquiring now who were the founders of this new science we shall hear unanimously quoted the names of England's sons—Graunt, Petty, Halley, Malthus. Gentlemen, tomorrow, when we are to begin our work, we shall meet within the venerable hall of the Royal Society. The representatives of Demography must feel a deep emotion when entering those rooms which are so intimately connected with the history of their science, for this is the place where 220 years ago Demography was created. It was in those halls, in their very first youth then, but soon conspicuous to the whole world by the genius of Newton, that appeared the work of Graunt which form the starting point of Demography, and here the King himself, admirably appreciating the work done, recommended the author to be received as a member of the learned society. It was there that shortly afterwards Sir William Petty, by his eminent power, raised the new science to political importance and to popularity, and in the same place again, in 1693, the famous Halley became the founder of the most important part of Demography, of Biometry, by working out the first table of mortality. And now the young science, which two centuries ago left those halls, shy and even without a name, has found its way over the whole globe. Having been worked out in Germany, having received a name and new ideas in France, and having been enlarged and imbued with a more scientific character by Quetelet, having got its well equipped office in every country of the civilised world, we are proud to see now its numerous representatives meet at the same place where two centuries ago this science was born. After a triumphant career of 220 years it returns to its home, to the old rooms in which it awoke to light, and again the Throne of England receives it with favour and benevolent interest. For Demography not less than for all statistical work, it is of the highest importance that its representatives, scattered as they are over the whole globe, should fully understand each other, for only so we can accomplish our aim, that our observations comprise equally all countries of the world, that our researches are conducted and worked out on the same principles everywhere, and that we may unite the incomplete and often discrepant descriptions of the single nations to a full descriptive history of the whole civilized mankind. This great aim fully deserves the praise the illustrious Prince Consort bestowed upon it from this very place 30 years ago. He said, "The importance of the congresses cannot be over-rated; they not only awaken public attention to the value of these pursuits, bring together men of all countries who devote their lives to them, and who are thus enabled to exchange their thoughts and varied experiences, but they pave the way to an agreement among different governments and nations to follow up these common inquiries in a common spirit by a common method and for a common end." May we, the posthumous statisticians of a second generation, add a little during this Congress to the great international work before us, and may to our successors the memory of this Congress and the name of its Royal President be as dear as the memory of the London Congress and its illustrious President is to us.

Sir **James Paget** (who was greeted with tremendous applause) began by proposing that they should offer their most cordial thanks to His Royal Highness for his goodness in accepting the office of President, and for the manner in which he had conducted the business of the day. He (Sir James) knew that his proposal would be accepted by all present, and he well knew the advantage the Congress would derive from His Royal Highness's presence, knowing, as he did, the advantage which the International Medical Congress of 1881 derived from his presence on the opening day. The purposes of the Congress were very wide, and if one attempted to define them, the definition would be the adoption of the means by which all nations of the earth might obtain as soon as possible, not only longer life, but the highest possible state of health both of body and of mind. He took no active part in sanitary science, but, as a looker-on, he thought that it was necessary that sanitary science should obtain the best knowledge that can be called together in all its branches, and he thought this Congress would materially help this end. Every section should understand that it meets not as a separate body, but as a member of one great design, and under the criticism of every other division of the Congress. That is what everyone who watches the course of medical science sees to be constantly necessary. There is a constant tendency to divide in such subjects, and no error could be more mischievous. Every section must be ready to work with every other to a common end. Some who called themselves very practical men might think there were many things under discussion which could not come to any degree of perfection, but some of the most brilliant discoveries arose from very improbable beginnings. Pasteur's discoveries, for instance, would never have come about but for the fact that Pasteur took up the study of alcoholic fermentation. To the discoveries which followed this investigation we owed the origin of two sections of the Congress—namely, Bacteriology and Preventive Medicine. Sir James hoped that we should come to the time when we could, as it were, tame some of the worst diseases, which to our successors might be comparatively harmless. In our own country excellent work had already been done in the Health Department of the Local Government Board, but much more remained to be done, and it would be well if the great loud voice of this Congress should make it clear to every Government of the world that it is its duty to promote the advancement of this science as much as it is to promote the ordinary routine matters of sanitary progress. Perhaps his Royal Highness would believe that the best proof of the thanks that they could render to him would be in the good works which that Congress might carry through. (The conclusion of the speech was greeted with loud and prolonged applause.)

Dr. G. **Buchanan**, chief medical officer to

the Local Government Board, seconded the motion.

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The Prince of Wales, in reply, said: Ladies and Gentlemen, if I have to undergo the ordeal of returning thanks for the proposal that has just been made to you, that ordeal has been made a very pleasant one by the very kind terms in which my old and valued friend, Sir James Paget, has proposed this vote. To you I make also my most sincere acknowledgments for the hearty way in which you have received it. We have all heard with the deepest interest the addresses that have fallen from the lips of those distinguished foreign delegates who have spoken to-day. Those who are familiar with the languages in which they spoke cannot but have been deeply impressed with what they said. It would be superfluous in me if, to use such a term, I were to "hark back" in any way with regard to the subjects which are before the Congress, or to allude further to what I have had the honour of saying, or to add to what you have heard from the lips of very eminent men to-day. But I most heartily congratulate this Congress and the large attendance here on what I regard as an augury of the work before them. Although the time before the Congress is unfortunately not long, I am sure we have every reason to be very grateful to those distinguished men who have come here from different countries of the world to be with us to-day, and who intend to give their valuable assistance during the work of the Congress. I feel very little doubt, although, perhaps, the outside public have occasionally sneered at the word "Congress," that from the interchange of ideas between ourselves and our foreign friends, and the matters of importance that will be discussed, if we can only arrive at a just conclusion it will be beneficial, not only to our own country and our own cities, but to the cities of other countries, by pressing forward such sanitary measures as will decrease disease throughout the world. In that case we shall, indeed, have lost no time in the work we are going through this week. (Loud cheers.)

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The Greek Minister proposed the health of graphy. This branch of science, the very nucleus of statistical work, which in fact is quite a science in its own right, has chosen the task to investigate the laws which regulate the life, increase, and decrease of nations. Its work, therefore, comprises three main parts: statistics of natality, of mortality (this part including biometry, the science of measuring the duration of human life), and of the increase of population. And when inquiring now who were the founders of this new science we shall hear unanimously quoted the names of England's sons—Graunt, Petty, Halley, Malthus. Gentlemen, to-morrow, when we are to begin our work, we shall meet within the venerable hall of the Royal Society. The representatives of Demography must feel a deep emotion when entering those rooms which are so intimately connected with the history of their science, for this is the place where 220 years ago Demography was created. It was in those halls, in their very first youth then, but soon conspicuous to the whole world by the genius of Newton, that appeared the work of Graunt which form the starting point of Demography, and here the King himself, admirably appreciating the work done, recommended the author to be received as a member of the learned society. It was there that shortly afterwards Sir William Petty, by his eminent power, raised the new science to political importance and to popularity, and in the same place again, in 1693, the famous Halley became the founder of the most important part of Demography, of Biometry, by working out the first table of mortality. And now the young science, which two centuries ago left those halls, shy and even without a name, has found its way over the whole globe. Having been worked out in Germany, having received a name and new ideas in France, and having been enlarged and imbued with a more scientific character by Quetelet, having got its well equipped office in every country of the civilised world, we are proud to see now its numerous representatives meet at the same place where two centuries ago this science was born. After a triumphant career of 220 years it returns to its home, to the old rooms in which it awoke to light, and again the Throne of England receives it with favour and benevolent interest. For Demography not less than for all statistical work, it is of the highest importance that its representatives, scattered as they are over the whole globe, should fully understand each other, for only so we can accomplish our aim, that our observations comprise equally all countries of the world, that our researches are conducted and worked out on the same principles everywhere, and that we may unite the incomplete and often discrepant descriptions of the single nations to a full descriptive history of the whole civilized mankind. This great aim fully deserves the praise the illustrious Prince Consort bestowed upon it from this very place 30 years ago. He said, "The importance of the congresses cannot be over-rated; they not only awaken public attention to the value of these pursuits, bring together men of all countries who devote their lives to them, and who are thus enabled to exchange their thoughts and varied experiences, but they pave the way to an agreement among different governments and nations to follow up these common inquiries in a common spirit by a common method and for a common end." May we, the posthumous statisticians of a second generation, add a little during this Congress to the great international work before us, and may to our successors the memory of this Congress and the name of its Royal President be as dear as the memory of the London Congress and its illustrious President is to us.

Sir **James Paget** (who was greeted with tremendous applause) began by proposing that they should offer their most cordial thanks to His Royal Highness for his goodness in accepting the office of President, and for the manner in which he had conducted the business of the day. He (Sir James) knew that his proposal would be accepted by all present, and he well knew the advantage the Congress would derive from His Royal Highness's presence, knowing, as he did, the advantage which the International Medical Congress of 1881 derived from his presence on the opening day. The purposes of the Congress were very wide, and if one attempted to define them, the definition would be the adoption of the means by which all nations of the earth might obtain as soon as possible, not only longer life, but the highest possible state of health both of body and of mind. He took no active part in sanitary science, but, as a looker-on, he thought that it was necessary that sanitary science should obtain the best knowledge that can be called together in all its branches, and he thought this Congress would materially help this end. Every section should understand that it meets not as a separate body, but as a member of one great design, and under the criticism of every other division of the Congress. That is what everyone who watches the course of medical science sees to be constantly necessary. There is a constant tendency to divide in such subjects, and no error could be more mischievous. Every section must be ready to work with every other to a common end. Some who called themselves very practical men might think there were many things under discussion which could not come to any degree of perfection, but some of the most brilliant discoveries arose from very improbable beginnings. Pasteur's discoveries, for instance, would never have come about but for the fact that Pasteur took up the study of alcoholic fermentation. To the discoveries which followed this investigation we owed the origin of two sections of the Congress—namely, Bacteriology and Preventive Medicine. Sir James hoped that we should come to the time when we could, as it were, tame some of the worst diseases, which to our successors might be comparatively harmless. In our own country excellent work had already been done in the Health Department of the Local Government Board, but much more remained to be done, and it would be well if the great loud voice of this Congress should make it clear to every Government of the world that it is its duty to promote the advancement of this science as much as it is to promote the ordinary routine matters of sanitary progress. Perhaps his Royal Highness would believe that the best proof of the thanks that they could render to him would be in the good works which that Congress might carry through. (The conclusion of the speech was greeted with loud and prolonged applause.)

Dr. G. **Buchanan**, chief medical officer to

the Local Government Board, seconded the motion.

The vote was adopted with loud cheers, the whole audience upstanding.

The Prince of **Wales**, in reply, said: Ladies and Gentlemen, if I have to undergo the ordeal of returning thanks for the proposal that has just been made to you, that ordeal has been made a very pleasant one by the very kind terms in which my old and valued friend, Sir James Paget, has proposed this vote. To you I make also my most sincere acknowledgments for the hearty way in which you have received it. We have all heard with the deepest interest the addresses that have fallen from the lips of those distinguished foreign delegates who have spoken to-day. Those who are familiar with the languages in which they spoke cannot but have been deeply impressed with what they said. It would be superfluous in me if, to use such a term, I were to "hark back" in any way with regard to the subjects which are before the Congress, or to allude further to what I have had the honour of saying, or to add to what you have heard from the lips of very eminent men to-day. But I most heartily congratulate this Congress and the large attendance here on what I regard as an augury of the work before them. Although the time before the Congress is unfortunately not long, I am sure we have every reason to be very grateful to those distinguished men who have come here from different countries of the world to be with us to-day, and who intend to give their valuable assistance during the work of the Congress. I feel very little doubt, although, perhaps, the outside public have occasionally sneered at the word "Congress," that from the interchange of ideas between ourselves and our foreign friends, and the matters of importance that will be discussed, if we can only arrive at a just conclusion it will be beneficial, not only to our own country and our own cities, but to the cities of other countries, by pressing forward such sanitary measures as will decrease disease throughout the world. In that case we shall, indeed, have lost no time in the work we are going through this week. (Loud cheers.)

As His Royal Highness left the hall the organist played "God Bless the Prince of Wales."

The Guildhall Conversazione.—The invitation card for the conversazione at the Guildhall is a gorgeous production. The City Arms and Supporters occupy the centre of the top border, grouped behind which are the flags of Great Britain and Ireland, France, Germany, United States, Austria and Hungary, Russia, Italy, Sweden and Norway, Spain, and Turkey. Around the border are the arms of all the British colonies and foreign States who are taking part in the Congress. The arms of the Lord Mayor and Sheriffs are in the centre of the lower part of the border, and on either side is a view of a glade in Epping Forest, and of the Holborn Viaduct, both places highly representative of the care and liberality of the Corporation in behalf of the health of the City and metropolis at large. Vignette engravings, representative of Earth, Air, Fire, and Water, occupy spaces inside the border.

Press Cuttings.—A Caution.—*It is probable that many members of the Congress have received offers from Press-cutting agencies offering to send reports of their speeches and references to them contained in the newspapers. We wish to caution all members not to pay any money in advance to any agency without making due inquiry.*

SIR ANDREW CLARK'S DINNER AT THE ROYAL COLLEGE OF PHYSICIANS.

Last evening Sir Andrew Clark had the honour of entertaining His Royal Highness the Prince of Wales. Among the guests were: The Greek Minister, Dr. Brouardel, Sir Douglas Galton, Ernest Hart, T. Holmes, Esq., F.R.C.S., Sir Joseph Fayrer, Dr. F. Poore, Dr. Tatham, Dr. Armstrong, the President of the Society of Medical Officers of Health.

Sir **Andrew Clark** proposed "The Health of Her Majesty the Queen." He said that there were two ways of proposing the toast—one the formal or military, the other the affectionate or ordinary; the latter was the better. The Queen was the symbol of all that was noble. Kings of England had fought and won, but she, the most constitutional Sovereign who ever sat on the English throne, had claims to our admiration because she was steadfastly loyal to the rights and privileges of the people, and she possessed the sympathies and graces of the highest womanhood, which were shown in her simple noble life. No woman was ever loved like our Queen, and, therefore, we say, God bless her.

In response to the toast of "H.R.H. the Prince of Wales," H.R.H. the **Prince** said that 20 years ago he got an illness from living in an unhealthy house, but thanks to Sir William Gull and Sir James Paget he was there to-night to express his sympathy with the operations of the Congress—a Congress which had drawn scientific people from all parts of the world. Endorsing the sentiments of all present, he wished to thank Sir Andrew Clark for his hospitality, which his high position in the profession enabled him to bestow.

Sir **Joseph Fayrer** proposed "Prosperity to the International Congress of Hygiene and Demography," and expressed his pleasure at meeting scientific people from all parts of Europe. He said that we had much to learn, and perhaps our distinguished guests would be able to teach us. This Congress must have the happiest results in the science of hygiene. We are much indebted to the King of the Belgians for initiating successfully at Brussels the first hygienic congress. As for this Congress, it is impressing all nations with the utility and value of the subject; and, in conclusion, he hoped the result of their deliberations would be of assistance to the human race at large. With the toast he associated the name of Dr. Brouardel, of Paris.

Dr. **Brouardel** spoke in French, and replied in eloquent terms.

Sir **Douglas Galton** said that the Congress was most successful. Delegates came from all parts of the world, at the invitation of his Royal Highness, to teach us the application of the science to the details of daily life. The success was in no small measure due to the fact that the Prince was president, the Queen patron. He trusted that the good it might do would be far-reaching—would do good, not only to this country, but to our colonies and to India, which required so many sanitary measures, a country which he was so glad to see well represented at the Congress. He thanked the foreign delegates for coming such a long distance, and he hoped that they would be made comfortable and feel at home during their stay.

The **Greek Minister** proposed the health of

"The President of the Royal College of Physicians."

Sir ANDREW CLARK responded.

CONVERSAZIONE AT THE ROYAL COLLEGE OF SURGEONS, LINCOLN'S INN FIELDS.

THE conversazione at the Royal College of Surgeons took place last night. The guests began to arrive soon after nine o'clock, and were received by the President, the Vice-President, and the Council in the Inner Hall, which was decorated with choice flowers. The band of the Royal Artillery played in the Museum, under the direction of Cavaliere L. Zavertal. The following is a programme of the music:—

MARCH	"A Piedigrotta"	...
OVERTURE	"Mierielle"	*Gounod.*
WALTZ	"Wiener Blut"	*Strauss.*
SELECTION	"Dinorah"	*Meyerbeer.*
SONG	"Trumpeter von Säkkingen" (*Cornet Solo.*)	*Nessler.*
PIZZICATO	"Al Fresco"	*L Zavertal.*
...	"Weaner Madl'n"	*Ziehrer.*
IDYLL	"Mill in the Forest"	*Eilenberg.*
SELECTION	"Traviata"	*Verdi.*
GAVOTTE	"Königinn Christine"	*Schmid.*
WALTZ	"Doctrinen"	*Strauss.*
SELECTION	"Postillon de Lonjumeau"	*Adam.*
MARCH	"Neapolitan"	*L. Zavertal.*

In the library several choice and rare books were displayed. In the Council-room a number of microscopes were prepared, showing sections of tissues and also micro-organisms.

The soirée was admirably managed, and although such a number attended, there was no inconvenience. Among the guests were several gentlemen in uniform, and some of the eminent Hindoos excited attention on account of wearing their national and beautiful costumes.

SOCIAL AND OTHER ARRANGEMENTS.

TO-DAY.

Garden party at Baroness Burdett-Coutts', Holly Lodge, Highgate, 4 p.m. to 7 p.m.

Conversazione at the Guildhall, 8 p.m. to 11 p.m. (Ladies and Gentlemen).

Visit to Refuse Disposal Company, Chelsea, 2.30 p.m. Limited to 48. Breaks will be provided.

Zoological Gardens open to members on presentation of Congress ticket.

Royal Botanical Society's Gardens open to members on presentation of ticket.

Daily Reception by the Ladies' Committee (President, Mrs. Priestley), at Messrs. Agnew's Picture Gallery, marked N on the plan, 10 a.m. to 12 noon.

WEDNESDAY.

Garden party at Sir Edwin Saunders's, 4 p.m. to 7 p.m.

Lord and Lady Wantage's garden party, 4 p.m. to 7 p.m.

Reception at the National Health Society, with exhibition of nursing and sanitary appliances, 4 p.m. to 7 p.m.

Garden party at the Royal Normal School for the Blind, 2.45 p.m.

Soirée at the Royal College of Physicians, 9 p.m. to 12 p.m. (Gentlemen only.)

Dinner by the Public Health Medical Society.

Dinner by the Fellows' Club. (By special invitation.)

Visit to Refuse Disposal Company, Chelsea, 2.30 p.m. Limited to 48.

THURSDAY.

Reception at the Parkes Museum, 4 p.m. to 7 p.m.

Visit to Wormwood Scrubs Prison, 3.30 p.m.

Subscription dinner at the Crystal Palace, followed by an exhibition of fireworks. Tickets 10s. each, admission to Palace included. (Ladies and gentlemen.)

Excursion to Ealing, 1.22 p.m.

Visit to Refuse Disposal Company, Chelsea, 2 30 p.m. Limited to 48.

FRIDAY.

Visit to the Royal Naval Exhibition on presentation tickets to foreign members.

Inspection of the hospital ships under the Metropolitan Asylums Board at 2 p.m.

Visit to the Beckton Gasworks and to the sewage outfalls at Barking, with lunch on board Sir Donald Currie's steamer "Drummond Castle." Limited to 190.

Garden party at Sir Spencer Wells's, 4 p.m. to 7 p.m.

Conversazione at South Kensington Museum (Ladies and gentlemen.)

SATURDAY.

Visit to the Thames Ironworks at 10.30 a.m., with vegetarian banquet at the works.

Excursions to Hampton Court and garden party at Normansfield by Dr. Langdon Down.

Excursions to—

- Cambridge, limited to 60.
- Bournemouth, limited to 20.
- Windsor Castle.
- Gravesend, to attend meeting of the Sanitary Inspectors at 1 p.m. Limited to 12.
- Netley Hospital, with luncheon at the hostal mess.
- Birmingham, to inspect the destructors and sewage farm. Limited to 50.
- Wolverhampton. Limited to 24.

SUNDAY.

Sermon by the Ven. Archdeacon Farrar, D.D., F.R.S., at Westminster Abbey at 3 p.m.

Dr. George Buchanan's excursion on the river from Maidenhead. To leave Paddington at 10.10 a.m. Limited to 50.

CONGRESS TICKETS, ETC.

On Monday and Saturday the work at the offices was extremely heavy. Notwithstanding the frequently repeated announcement that it was highly desirable tickets should be obtained beforehand, comparatively few of our foreign visitors actually got their tickets until within the last few days. Yesterday (Monday) every tongue spoken in Europe was heard at the reception-rooms, and the officials were much harassed opening letters, answering inquiries, and receiving telegrams up to a late hour.

There has been some confusion as to ladies' tickets, this remark particularly applies to the Conversazione at the Guildhall. Many members who are holders of ladies' tickets, only received an invitation for themselves, but it must be remembered that the number of guests is embarrassingly large; and that even the accommodation at the Guildhall is limited. It is expected that a percentage of the tickets will be returned by gentlemen and ladies who are unable to attend, so that those who are at the moment disappointed may to-day find an invitation waiting for them.

THE ORIGIN OF THE CONGRESS.

It is well at this moment to refer to the origin of the Congress, which has been clearly stated by Dr. Corfield in a communication made some time ago to *Nature* as follows:—

In 1884 I was asked by the Organizing Committee of the Congress to be held at The Hague that year to give an address at a general *séance* of the Congress; I did so, selecting as my subject, "La Science Ennemie de la Maladie." During the meeting of that Congress, one of the most pleasant that I ever attended, I was frequently asked why we had never invited the Congress to London, and I was obliged to answer that our Government would give no pecuniary assistance for such a purpose, and that we had no Hygiene Society strong enough to undertake it; but I determined that anything I might be able to do to bring about that result should be done, as I felt that it was a disgrace to this country that this Congress, of all others, had not been here.

The next Congress was to be held in Vienna in 1886, but was postponed until 1887, and in that year my opportunity came in the proposed amalgamation of the Sanitary Institute of Great Britain and the Parkes Museum. I urged the importance of the matter on the Councils of both those bodies, and induced them to pass resolutions inviting the Congress to hold its next session in London. Sir Douglas Galton (as Chairman of both Councils) and I were appointed delegates to attend the Congress at Vienna, and present the invitation; the Society of Medical Officers of Health was also asked to co-operate, and appointed Mr. Shirley Murphy as its delegate. We three went to Vienna, and presented the invitation, which was accepted. After our return to this country we set to work to form, with the aid of the other English members of the Vienna Congress, especially Sir Spencer Wells, Prof. (now Sir George) Humphry, Dr. Cameron, M.P., Prof. Frankland, and Dr. Mapother, the large and influential General Committee.

In the early days it was thankless and rather trying work, especially as the money did not come in as readily as we could have wished; but now, thanks to the patronage of Her Majesty the Queen, to the presidency of His Royal Highness the Prince of Wales, and to the support of the Lord Mayor and Corporation of the City of London, it is comparatively plain sailing; and there can be no doubt that the Congress will be a great success, to which no one will have contributed more than Sir Douglas Galton, the indefatigable Chairman of the Organising Committee. I may add that all general correspondence relating to the Congress should be addressed to Dr. G. V. Poore, the Hon. General Secretary, at the offices, 20, Hanover Square, W.

THE SECTIONAL MEETINGS.

The sections meet to-day at ten a.m., and the real business of the Congress begins. The original arrangement was for each section to finish its day's work at two p.m., but from the wealth of material this will not in all cases be found practicable. Much will depend upon the chairmen of the meetings. A good proportion of the papers may be read in abstract, and in every case no speaker should be permitted a longer time than that which is laid down.

Homes of the Sections.

Section I., that of Preventive Medicine, will meet in the rooms of the Society of Antiquaries, Burlington House. These are situated on the west side of the quadrangle, and are approached through the entrance from Piccadilly. (*See Plan B.*)

The Society of Antiquaries was founded in 1707 by three gentlemen, who agreed to meet every Friday evening at six, "under pain of forfeiture of sixpence." At the second meeting of the Society, which took place on December 12th, 1707, at the Bear Tavern in the Strand, it was "agreed that the business of the Society shall be limited to the object of antiquities, and more particularly to such things as illustrate or relate to the history of Great Britain prior to the reign of James I." From the Bear Tavern the Society afterwards moved to the Young Devil, and in 1739 to the Mitre in Fleet Street. By this time the members numbered 100. In 1751 George II. granted a charter to the Society, and in 1777 George III. set apart some rooms in Somerset House, Strand, for the exclusive use of the Society. These apartments were thus occupied till 1866, when the Antiquaries removed to their present quarters at Burlington House.

Section II., that of bacteriology will meet in the rooms of the Royal Society, which are situated on the east side of the quadrangle of Burlington House. (*See Plan C.*)

The foundation of the Royal Society dates from 1645, when meetings were held in Cheapside and at Gresham College. The Great Rebellion, which interrupted all peaceful pursuits, dispersed the members of the Society, and for a brief time Oxford became the *rendezvous* of the learned. Soon after the return of Charles II. from his prolonged continental travels, the Royal Society was incorporated under Royal Charter, and the King and the Duke of York became members of the Society. It was at the opening meeting that his sacred Majesty amused himself at the expense of the learned company by getting the explanations of the more ingenious as to why it was that when two pails of water were put into scales and equally poised, the addition of two live fishes to one of the pails did not cause any apparent increase of weight. Charles was accused by his enemies of instituting the Society "to divert the attention of the people from discontent." As late as Johnson's time the "wits" ridiculed the Society "for what reason" says Johnson, "It is hard to conceive, since the philosophers professed not to advance doctrine, but to produce facts, and the most zealous enemy of innovation must admit the gradual progress of experience, however he may oppose hypothetical temerity." At the present time it would not be necessary to justify the existence of the Society by such ponderous phrases, for to be a Fellow of the Royal Society is one of the greatest distinctions to which a scientific man can attain. The F.R.S. is the "Blue Ribbon" of science.

Section III., that of diseases of animals, will meet in the rooms of the Geological Society. (*See Plan D.*)

The Society was founded in 1807, and incorporated by Royal Charter in 1826. It was established "for investigating the mineral structure of the earth," and its first home was at Somerset House.

Section IV., that of infancy and childhood, will meet in the theatre of the London University. (*See Plan E.*) It may be well to point out that the entrance to the London University is in Burlington Gardens only, and that the entrance to Burlington House is in Piccadilly. There is no *direct* way from Burlington House to Burlington Gardens, and the shortest way is through the Burlington Arcade. (*See Plan.*) The Albany is private property, and is not open to members of the Congress.

Section V., that of Chemistry and Physics, will meet in the rooms of the Chemical Society. Burlington House. (*See Plan F.*)

This society was founded in 1841, and incorporated by Royal Charter in 1848. Its objects are "the promotion of chemistry, and of those branches of science immediately connected with it."

Section VI., that of Architecture, will meet in the London University West Examination-room (*See Plan G.*), and

Section VII., that of Engineering, in the East Examination-room. (*See Plan H.*)

Section VIII., the Naval and Military Section will meet in the rooms of the Linnæan Society, Burlington House. (*See Plan I.*) This society was founded in 1788, and incorporated in 1802. Its objects are the study of natural history. It formerly met in Soho Square in the house once occupied by the famous Sir Joseph Banks.

Section IX., that of State Hygiene, will meet in the rooms of the Royal Astronomical Society, Burlington House (*See Plan K.*) This society was founded in 1820, for "the Encouragement and Promotion of Astronomy," and was incorporated in 1831.

The Section of Demography will meet in the Museum of Geology in Jermyn Street. (*See Plan L.*)

In addition to the rooms for the meetings of the Congress, "Press-rooms" are provided at the London University for the sections which meet there; at the Royal Academy of Arts for the sections which meet at Burlington House; and at the Museum in Jermyn Street for the section of Demography. The Press-rooms, which are, not as the name would seem to imply, for the use of journalists, but are provided for those members of the Congress who wish to write letters or to correct their papers before sending them to Public Health. The Press-room at the Royal Academy of Arts is on the first floor, and is worth visiting from its associations with the past. It formed part of Old Burlington House, a house associated with the memories of Pope, of Swift, the theologian, and of Handel.

It is unfortunate that the summer exhibition of the Royal Academy is over, especially as two of the most popular pictures, those of Fildes and of Dicksee, dealt with medical subjects; but the Gibson and Diploma Galleries of the Academy (*see Plan Q*) will be open, and should certainly be visited by those members of the Congress who are interested in pictures. In addition to many good examples of the works of Academicians, the Galleries contain a fine drawing by Leonardo da Vinci, and a contemporary copy of that great painter's masterpiece—the fresco of "The Last Supper," the mouldering traces of which attract English visitors to Milan. The picture possessed by the Academy is ascribed to Marco d'Oggione and was formerly in the Certosa at Milan.

Richard Sisley, M.D.

THE BACTERIOLOGICAL MUSEUM.

The Bacteriological Museum will be found at the top of a building in the University of London. The building is well-lighted, airy, and around the room are hung diagrams of micro-organisms. The tables are well supplied with microscopes, and at table 1 are a large number of most beautiful photographs, suitable for lantern demonstrations.

At table 2 Professor Crookshank exhibits some very interesting old books, illustrating the early literature of bacteriology. Among these is a curious and valuable work by Athanasius Kircher (1646), who expressed his belief that diseases were due to living organisms. There are also a copy of Leeuwenhoek and the work of Nicolas Audry, 1701; a copy of Lancisi, 1718; the works of Spallanzani, 1769; and the works of Dujardin, 1841; and Perty, 1852, both with illustrations of bacteria.

At the same table are Dr. Crookshank's microscopical preparations from equine anthrax, swine anthrax, swine malignant œdema; also of streptococcus pyogenes in cattle and in man; streptococcus of erysipelas; tubercle bacillus in cream; actinomycosis in cattle and in man; also of tubercle bacillus (pure cultivations), and photographs of the same.

At table 3 Dr. Washbourn (Guy's) exhibits numerous microscopic specimens of anthrax in various organs and various animals, also of pneumonia. Dr. Lodge has specimens of woolsorter's disease from Bradford. Sir Hugh Beevor has a large collection of tubercle bacillus grown in various media. Professor Arloing, of Lyons, exhibits a machine for counting bacteria in fluid, and a petroleum thermo regulator.

At table 4, Dr. Kral (of Prague) exhibits a complete bacteriological collection of plate cultures. There are here about 100 beautiful specimens. Dr. Murray shows tetanus and swine endocarditis. Dr. Shattock, culture and microscopical specimens of pyogenic micro-organism in urine.

On the walls, Dr. Sims Woodhead shows some micro-photographs. Mr. Pounde, of King's College, shows an admirable collection of coloured diagrammatic representations of various bacilli.

At table 6, Dr. Wm. Hunter exhibits a collection which he has made of various ptomaines, and here may be seen some new chemical antiseptics belonging to Professor Hueppe.

At table 7 may be seen the parasites—red corpuscles from cases of Texas fever, and a collection of cultures of swine fever and Texas fever.

At table 8 Professor Arloing shows a fine collection of coloured micro-photographs. There is here also a collection of micro-photographs from the Pasteur Institute. On an adjoining screen Mr. Pringle has some micro-photographs.

At table 9 Dr. Sims Woodhead exhibits sections of the whole lung, stained in various diseases. On the wall near at hand Dr. Nāuhauss, of Berlin, exhibits various micro-photographs.

At table 10, in the centre of the room, and near the entrance, Professor Klein exhibits cultivations in gelatin of the following microbes: 1. Several species of streptococci. 2. Several species of bacilli connected with meat poisoning. 3. Cultivations in gelatine of bacillus diphtheriæ from human diphtheria, cow diphtheria, cat diphtheria, and guinea pig. 4. Cultivations of bacillus of Middlesborough pneumonia. 5. Cultivations of bacillus of grouse disease. 6. Cultivations of bacillus of fowl enteritis. 7. Cultivations of bacillus of malignant œdema. 8. Cultivation of eight different species of cholera bacillus. Also numerous lantern slides of bacteria, pathogenic, chromogenic, etc.

In the centre of the room there is an electric microscope for projection, and Sir H. Roscoe and Mr. Joseph Lunt exhibit an apparatus for demonstrating bacteria in sewage.

Near the entrance door Dr. Delepine shows a very complete set of specimens from cases of leprosy. There are here sections from skin, spleen, liver, lung, and cover-glass preparations from sputum of a patient affected with leprosy; also microscopical sections in cases of leprosy, general tuberculosis, acute yellow atrophy, actinomycosis; also interlamellar cultivations of various moulds and fungi, both pathogenic and non-pathogenic. Dr. Wethered exhibits tube specimens of pseudo-tubercle cultivated on gelatine and agar agar. He has six cover-glass preparations demonstrating the bacillus.

COMPRESSED TEAS MANUFACTURED AT HANKOW, CHINA.

Tea Tablets.—Tablet tea is manufactured at Hankow in factories belonging to Russian firms here. It is made of the finest tea dust procurable. The selection of the dust is the work of skilled experts; the cost of the dust varies from 10d. a pound upwards. This dust is manufactured into tablets by steam machinery. About 2⅓ oz. of dust are poured into a steel mould on a steel cylinder. The dust is poured in dry without steaming, and the pressure brought to bear is two tons per tablet. Great care is required in the manufacture and packing of tablet tea, and the cost is comparatively high. The tablets are wrapped first in tinfoil, then in expensive and attractive paper wrappers, and finally packed in tin-lined cases for export to Russia.

The tea, it is stated, loses none of its flavour by being pressed into tablets, and as tablet tea is only one-sixth of the bulk of leaf tea it is most convenient for travellers, and also for importing into the remoter regions of Russia.

It may be possibly worth the while of our commissariat to test this tablet tea with the view of supplying our army with tea in so portable a form.

Brick Tea.—Under the heading brick tea, the imperial maritime customs class what are really two commodities which resemble each other in being shaped like bricks, and in being made of tea. The first is made of tea dust, and is consumed in Russian Siberia. The second is made of tea leaves, stalks, and refuse of the tea dust bricks, and is consumed in Mongolia. Both are manufactured in factories in Hankow belonging to Russian firms.

Tea dust brick tea is made from common tea dust, and adheres by pressure after being steamed in a cotton cloth bag for a moment. The pressure is hand pressure, *i.e.*, the quantity of tea dust required is placed in a bag, and, after being steamed, is poured into a wooden mould, and is pressed to the required consistency by blows from a heavy mallet wielded by one of the labourers. The cost of the common tea dust is between 1⅓d. and 1⅔d. per lb. The cost of manufacture, export duty, packing, &c., about doubles the price; so that the cost on board ship for export from here amounts to, say, 2¾d. per lb. About 300 lbs. to 400 lbs. of brick tea go to a basket made of light bamboo. Two baskets form a camel load. Brick tea is in bulk about one-sixth of ordinary tea. Formerly much of the brick tea reached Urga by going up the Han river, and thence through the Ning-nsia gate in the great wall of China. In 1890 all the brick tea exported from this through the imperial maritime customs went by steamer to Tientsin, whence it found its way—the tea dust brick tea to Russian Siberia, and the other brick tea to Mongolia—through the Chang-chia gate in the great wall (Kalgan).

In Mongolia, where the nomad population of herdsmen have little use for money, their tents, clothing, food, and temples being supplied by their flocks, brick tea forms a standard of value and convenient medium of exchange, as it is in universal demand for food. A brick, or half a brick of tea, is placed in a copper coffee-pot-looking vessel and boiled up with mutton fat and butter, and the food is eaten hot in a liquid condition. On the cold highlands such food must be warming and nutritious.

The very slight decrease in the export of brick tea in 1890, as compared with 1889, is probably due to some trifling cause, such as weather preventing boats starting, or there being fewer working days in 1890, and not to a decrease in the trade.

Just lately a new commodity has come on the Hankow market, to which the customs give the name of log tea. It is an inferior tea with stalks, packed in the shape of logs, which weigh from 8 lbs. to 80 lbs. each log. The tea is wrapped in the leaves of the Bambusa latifolia, and then reduced in bulk by binding round the log with lengths of split bamboo. This log tea is sent to the Chinese ports for consumption, and is packed thus from motives of economy, both of packing and of freight.

The export of black tea shows a great diminution. This diminution is progressive. The export during the past five years has progressively diminished from 90,000,000 lbs. in 1886 to 67,000,000 in 1890. The cause is the competition of India and Ceylon. (Consular Report on the Trade of Hankow, 1890.)

The Sanitary Institute.—The Council have arranged to receive the members of the International Congress at the Institute, on Thursday next, from three to five p.m.

Notice to Members of the Congress.—Saturday Excursions.—The excursion to Friern Barnet is cancelled. Members are requested to note the alteration in the times of the trains for Cambridge. Full details will be given in Friday's edition of Public Health.

Society of Medical Officers of Health.—The Council of the Society wish to make it known to the medical members of the Congress that now would be a suitable time to join the Society, the year terminating at the end of next month.

Exhibition of Drawings of Sanitary Construction.—We would call the attention of members of the Congress to the exquisite collection of drawings in the library of the University of London. A full account we hope to give in our next number.

The Official List of Members of the Congress.—The official list of the members of the Congress, corrected up to August 7th, was published this morning. It consists of no less than forty-five pages, and every care has been used to ensure accuracy in all respects. In so long a list it is possible that some mistakes may have crept in, and members are asked to correct any inaccuracy which may have occurred.

THE ASSOCIATION OF SANITARY INSPECTORS OF GREAT BRITAIN.

The following interesting report, giving an account of the work and status of sanitary inspectors, will be communicated by the Chairman of the Council of the Association, Mr. Hugh Alexander, to the Congress, at a future meeting of Section IX.:—

The Council of the Association of Sanitary Inspectors of Great Britain have thought it would interest the members of the International Congress of Hygiene to hear a short report relating to the duties of the sanitary inspectors, and the conditions under which those duties are concerned, and how far they admit of being useful for public service in a sanitary point of view.

To the foreign visitors and members of the Congress the subject may, we think, be of some special interest, because the service we represent is singularly illustrative of the methods of progress peculiar to the English people.

Our organisation is, comparatively, a new departure from an old system, a development of one as ancient as our constitution itself. Since the days of Queen Elizabeth there has always existed in every distinct centre, every village even, an officer who might be considered a sanitary inspector, inasmuch as he possessed the power to remove any extreme nuisance that was injurious to the health of the community. This officer was the overseer of the highways; it was an elective office annually made by the local ruling authority or vestry, and it devolved on some responsible and respectable inhabitant, as did other offices, such as overseer of the poor, and even parish constable. In emergency these offices, in combination with others constituting the vestry, had the power also to appoint, temporarily, persons of various degree and influence to inspect and otherwise assist in the abatement of a nuisance, and of the causes leading to it. The authority could send out inspectors to view and report to them; they could draft persons from the parish workhouse or other places to form a cordon around infected localities; and, under some circumstances, they could remove the infectious sick to the pest-house or infirmary. This was a loose method of meeting the great visitations of disease, but it suited the apathy of the freedom expressed in the saying, "An Englishman's house is his castle"; and to this day the spirit of freedom so determinately remains, that in the Sanitary Act of 1866, in the twentieth section, it is practically again set forth almost in its primitive though somewhat retrograde form. By an Act of the year 1855, the first important changes in sanitary legislation in England were introduced. The Act was the result of long agitation and almost endless compromises. It ought to have been made some years before, when the new Poor Law came into existence, and many far-seeing men, including, first and foremost, our late distinguished President, Sir Edwin Chadwick, were most earnest to make the sanitary legislation for grievous sanitary evils uniform with the great social legislation affecting the poor. But in our usual one thing at a time and gradational fashion, the Sanitary Act remained until the date named, 1855.

Amongst other important modifications of law, brought in by the Act of 1855 was that of medical supervision of the public health. A large and organised staff of medical officers of health was instituted. These officers were to be the elected of the local authority, and were to be at the mercy of that authority in every case. It was in vain that the more advanced reformers declared that the medical staff, in order to be able to perform its great duties with full and complete effect, must be left with proper independence of action. They were shorn of all power, except that of report to their authority.

Origin of Present System of Inspection.

The office of sanitary inspector, so-called in the first instance, came into existence as the office, so to speak, of the medical officer. The selection and election of the sanitary inspector did not, however, rest with the Medical Officer of Health; it was retained by the vestry or local authority. In early days it often happened that the Medical Officer of Health "found" the inspector for the vestry, and his own recommendation or influence secured the election. In time, as the office increased in importance and as the duties were discovered to clash sometimes with local and personal interests, the election became more stringent, and now there may be as sharp a contest for the post of inspector as for any other post that falls under the vote of the elective authority.

The First Selection of Inspectors.

From the circumstances under which the new body of inspectors originated on the Act of 1885, it followed naturally that there was at first no union or bond between them. They were selected from various classes of the working community without any special idea of fitness for the office, save and except respectability, good character, and in some cases, especially in populous parts of great cities, a knowledge of the district in which it was their mission to labour. The office itself was not enticing to men who felt they could do better. It was always underpaid; it was always held at the pleasure of the authority, with risk of immediate dismissal; it was unthankful, since there were over it really three masters, the local board, the medical officer of health, and the public that had to be served; and, as may be expected, it was not at its best a pleasant office, since it caused those who followed it to have to enter and inspect the worst dens of disease of the infectious kind, to report on their condition, to superintend the removal of nuisances, and to disinfect infected rooms and clothing.

The men selected for office were, consequently, a peculiar people; men who had nothing better to do, and men, like policemen and soldiers, who had filled their terms in the services, and had learned to become accustomed to duties in which there was some personal risk. We do not feel in any sense ashamed of such a beginning—on the contrary, we are proud that a good, courageous, and honest body of men of this sort were found for it. We only name the fact to indicate the history of our organisation and the changes which have taken place, leading, as we venture to think, to changes that ought to be made in our status and position.

For many years we remained in the condition described, fulfilling an irksome and almost impossible responsibility without a spark of independence, and performing important labours, at its best, with slowness and anxiety, and facing, daily and hourly, contending interests. The result has been that we have constantly been blamed for interference, and accused of apathy or idleness. For example, in the report of the Royal Commission on the Working Classes, it was said that much evidence was given from various parts of London which proved both the absence of adequate inspection and of sufficient activity on the part of the inspectors. The perfunctory work of the inspectors was commented on, and it was argued that, according to the custom of certain portions of the metropolis, it really did not matter whether the staff of inspectors were large or small. The same Commission insisted that trained men should alone be employed for inspectorship, and that the authorities should in all cases "select persons acquainted with the principles of sanitation and of building construction."

The opinion thus expressed by the Commission is that which we ourselves had discovered long before. Our work, in fact, became by a process of evolution less of a mere manual service, and more of a true and life-saving science—a very simple science in itself, no doubt, and very common-place, but still useful, and something more than a mere servitude to those who carried it out.

To be very plain, as we worked we began to learn. We picked up information from all quarters; from the medical officers of health we gathered large sums of information in the details of scientific sanitation; their directions became our lessons, and they our learned professors. Out in our daily work we got an insight, which no other officers ever before got, of the habits of the people and of the conditions of their homes and sanitary wants. We saw the defects under which they laboured and still labour; we ascertained what, to use a common but descriptive expression, they would and would not "stand" in the way of sanitary reform; and we gauged so precisely what could and what could not be done by law to remove dangers to health, that now and then a lawyer himself does not think it beneath him to take a hint from us as to what he can successfully condemn or defend in matters relating to nuisances and their abatement.

Under such progressive influences as these we began, about nine years ago, to organize amongst ourselves, and in time we formed the Association of Sanitary Inspectors of Great Britain, which now numbers several hundreds out of the 2,000 of our class in this kingdom.

We were fortunate at once in securing the late Sir Edwin Chadwick as our president. He was a man removed from all party influences, and under the encouragement he gave us, and under the influence of his simple and at the same time comprehensive ideas of true sanitation, we advanced rapidly towards better organisation and system, so that we are passing at this moment from an irregular and accidental multitude into something like a professional body, with fixed views and common aspirations for a more useful, intelligent, and independent future. We have found in these aspirations one most hopeful sign. We are becoming remarkably in touch with the public, far more so than we originally anticipated. Our public meetings are well attended, well supported, and favourably noticed by the great organs of public opinion, and there is a living sympathy with us in all classes of society, from the highest to the humblest, arising, as we think, from the facts that the public opinion on sanitation is improving, and that we are recognised as the active instruments by which the sanitary measures that have to be adopted are worked out. We come into contact daily with people in their homes and speak with them on matters of practical sanitation more than any other persons in the army of sanitary reformers. We also often meet together amongst ourselves to discuss, in our own way, the most practicable and useful methods for carrying out our work; we read and discuss papers, and whenever we can we obtain lectures and papers from gentlemen who belong to other departments of sanitation, and who have greater scientific knowledge than we claim to possess.

In the preceding passages we have noticed the origin and intention of our association. We now proceed to describe the wishes and hopes we entertain for the future of those who are to be participators in our work. It will be gathered already that we are no longer the accidental and untrained collection that we once were; that we are so far advanced in years as to have commenced to entertain and form ideas of our own. These we would desire respectfully to place under heads.

(*a*.) Education of the Sanitary Inspector.

We think the time has come when no sanitary inspector should be competent for election to his duties until he has shown a fair elementary educational standard. He should, we think, not only be thoroughly master of what in English is called the three R's (reading, writing, and arithmetic), but he should have an elementary knowledge of chemistry, so as to understand the action as well as the practical application of the different gases and liquids which are used for disinfection and purification; of physical science, sufficient to give him an intelligent system for dealing with mechanical methods of sanitation; of architectural construction, enough to show to him what is necessary for health in the dwelling-house and in public buildings; and, lastly, of those general rules of sanitary science and sanitary legislation as shall fit him to perform all that he has to undertake with that soundness of judgment and knowledge that alone gives confidence to the inspector himself, and to those for whom he is engaged. These would be advantages which the past race of inspectors has much felt the need of, and the remembrance of his need leads us to feel more anxious to make the path of work and duty easier and better for those who are to follow in the same walk of life.

Our council thinks that a school or college devoted to education in the departments specified is urgently demanded, and we are considering at this moment how the project can be brought most readily and effectively into action.

(*b*.) Qualification of Sanitary Inspectors.

In addition to systematic education, we feel that a system of examination for competency for the discharge of duties is now demanded, and before any candidate for office is permitted to compete for a post, he ought, we hold, to produce a qualifying certificate or diploma. The council would prefer that Government, through one of its departments, say the Local Government Board, should appoint an examining board for this duty but, failing this, we feel that certain examining bodies should be officially recognised as supplying the facilities for examination of candidates, and for granting a diploma to successful competitors. They also think that after obtaining the ordinary qualification, the inspector should find his primary qualification a stepping-stone for advancement to a more stringent competition, leading to qualification for higher duties, such as that of sanitary surveyor, who might take the general supervision of inspectorship over large districts, and give uniformity to sanitary inspectors over all the kingdom.

(c) TENURE OF OFFICE, AND PROTECTION IN PERFORMANCE OF DUTIES.

As will be observed already, the sanitary inspector has no protection in the performance of his official duties. He has no tenure of office beyond what the local authority pleases to give him; and he may be discharged at any time for doing an act of the most important usefulness. This takes from him independency and heart for his work, and often subjects him to the most serious misapprehensions. The public has no conception of his position in this respect. On this subject our present President, Dr. Benjamin Ward Richardson, wrote a short letter in reply to a question addressed to him by a public man who wished to be informed on the rights of the inspectors for the protection we seek. The President said—

"No class of public officers require protection in the performance of their duties more than the sanitary inspectors. The suggestion of a sanitary defect or of a sanitary improvement, even by sanitarians so independent as myself, is constantly a cause of annoyance and serious misunderstanding. How much, therefore, must the inspector who is the active instrument for doing what others, who rarely appear, and who in their collective capacity do not individually exist, direct to be done, have to contend with. I have heard one of them abused as if he were committing a great wrong or performing a piece of wanton mischief, at a time when the duty he was carrying out was of vital importance to health and life. Moreover, the urgency of the services of the inspector is made no excuse for their most timely activity. In the work of sanitation, promptness of action is often the direct principle of success. I remember in my early professional life being called to visit a youth who had been brought into a provincial town suffering from some obscure disease. I discovered that it was small-pox, and after attending to the man, my next care was to secure his isolation, because if that could have been done an epidemic could be stopped at once. It could not be done, and the result was that, in a few weeks, an outbreak of small-pox was rampant, and many persons died from it. The sanitary inspector even of to-day has constantly to stand and watch in crises equally serious. He is one of the police of sanitation, and is first on the scene of danger; but he dare not, on his own instance, interfere, although he may know perfectly well what, at the moment, is the very best thing to do. Imagine a policeman similarly crippled in the performance of his duties. Imagine a policeman seeing a burglar entering a house by the window, obliged to let the robber do his work that he may first report to his office that the burglary is in progress, and get instructions what course he ought to pursue in order to stop the robbery and suppress the thief. Or imagine a fireman called to a fire having to go to his office to report the fact, and wait for orders before he dare turn on the water. It is preposterous. The sanitary inspector, on discovering a dangerous nuisance, ought to be able to remove it instantly on his own responsibility. The common law will punish him fast enough if he should go wrong."

We ask for fixed tenure of office, and that we shall only be dismissible for misconduct or proved incompetency, with right to appeal to the Local Government Board; and we fail to see how that act of justice can be long denied to us. We also claim as a part of our duty that we shall periodically inspect, and have the power to remove at once all serious dangers to the public health on our own responsibility, subject to the confirmation of the local authority.

(*d.*) We think there is something in a name, and we know that for an office, as for a man, it is always injurious to be recognised by more names than one. We are sometimes designated by the title of sanitary inspectors, which was indeed the title first assigned to us, in 1855. Since then we have been designated inspectors of nuisances, and we prefer the original title as being more expressive of our duties and less objectionable to our official reputation.

We might add one more clause. We might urge with fairness that for our exclusive work salaries at a minimum of £25 and a maximum of £300 a year might be revised in our favour. But this is a topic it would be unbecoming to dwell upon in this place, and we conclude by saying how deeply we are obliged to this important Congress for affording us the opportunity of describing and defining the part we play in the history of English sanitation.

THE SANITARY STATE AND DEATH RATE OF FIUME.—The birth rate is diminishing, the death rate is 38 per 1,000 (1890), the high death rate is in part due to the influenza epidemic which prevailed in the early part of the year, and also to abnormal phases of the temperature and climate (excessive drought and heat last summer, and an unhealthy autumn). But, apart from these exceptional circumstances, the reasons are to be sought in the deplorable sanitary condition of the town, owing to the abominable drainage, and to the want of proper water supply. To these causes are due the continual epidemics prevailing more especially among the infant population, which raise the rate per annum at times to as much as 80 per 1,000. The death-rate among the children is in fact appalling, when it is considered that it amounts to two-thirds of the number of births. Putting aside the effects of climatic extravagancies, Fiume might be made one of the healthiest towns of Europe from a sanitary point of view. Water there is plenty and of the best, if it were only made proper use; but the question of the water supply remains as it was ages ago, and the drainage in statu quo ante. The streets are insufficiently watered, and diseases of the chest and throat, owing to the dust, are much more numerous, and the death-rate from such ilnesses much higher than it need be. The pavement of the streets is also one of the many sanitary measures which has been "studied" for ever so many years, but which is so far not realized, although the funds are available. It seems, however, there is some prospect of this question being taken up in earnest in the course of the present year. Meanwhile out of three children born two are doomed to death in an early stage of infancy—truly a dismal picture, but none too severe a criticism of municipal supineness.—*Consular Report, Austria-Hungary.*

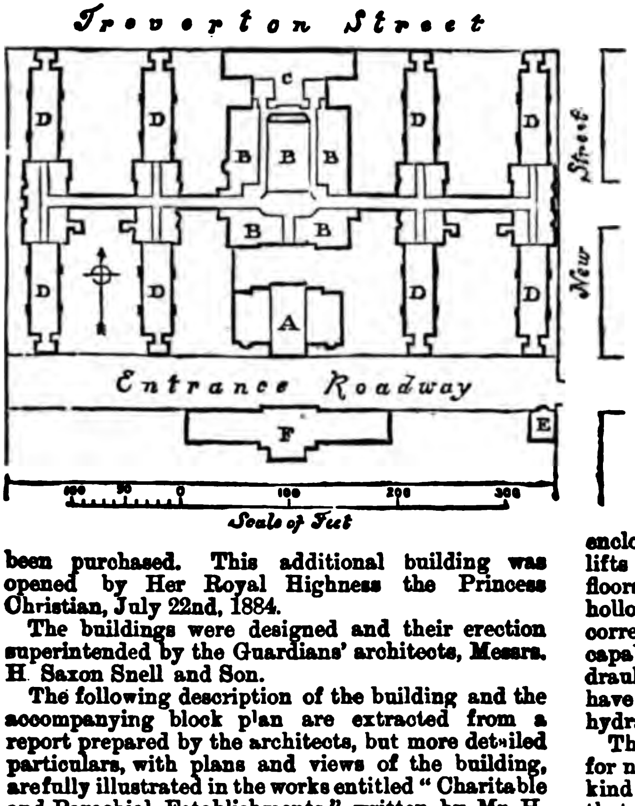
MODEL INFIRMARIES FOR THE TREATMENT OF THE SICK POOR.

I.—THE ST. MARYLEBONE INFIRMARY.

The St. Marylebone Infirmary, for the treatment of the sick poor, is not situated in the parish, because it was not possible for the Guardians to purchase a suitable site in the borough. Hence its present position in Rackham Street, near the Notting Hill Metropolitan Station. The following account is mainly taken from Mr. Saxon Snell's descriptive pamphlet:—

The building has been erected for the accommodation of 760 sick poor of the parish of St. Marylebone, and was opened by His Royal Highness the Prince of Wales on June 29th, 1881. The foundation-stone was laid, July 7th, 1879, by Edmund Boulnois, Esq., M.A., J.P., chairman of the St. Marylebone Board of Guardians.

The land upon which the Nurses' Home stands, and the road between it and the main building, did not originally form part of the site, but have since been purchased. This additional building was opened by Her Royal Highness the Princess Christian, July 22nd, 1884.



The buildings were designed and their erection superintended by the Guardians' architects, Messrs. H. Saxon Snell and Son.

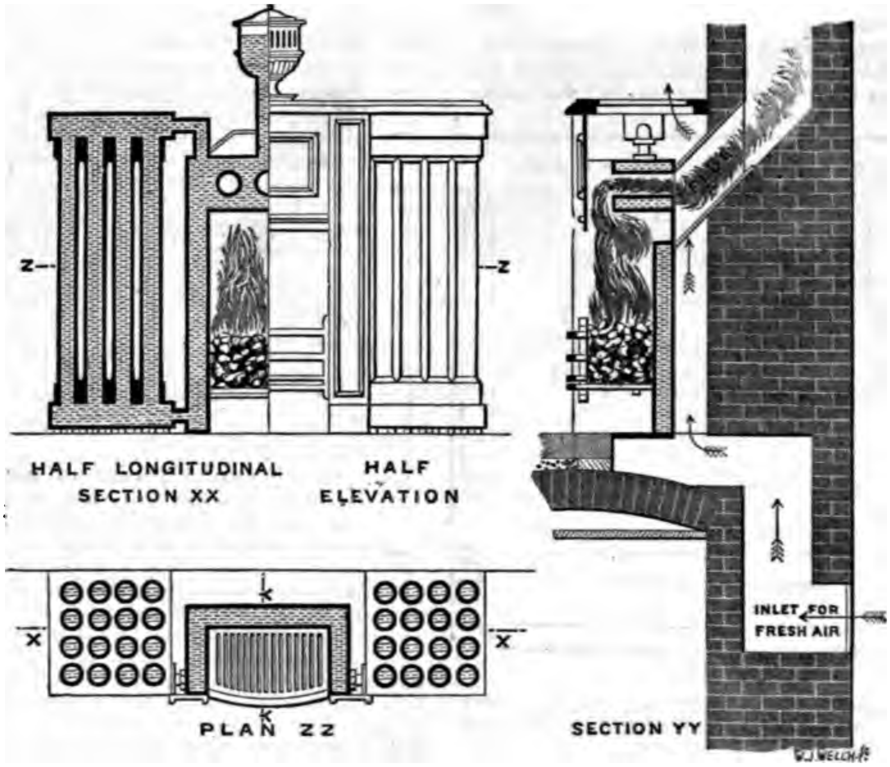
The following description of the building and the accompanying block plan are extracted from a report prepared by the architects, but more detailed particulars, with plans and views of the building, are fully illustrated in the works entitled "Charitable and Parochial Establishments," written by Mr. H. Saxon Snell, and published by Messrs. Batsford; also in "Hospital Construction and Management," written by Dr. F. J. Mouat and Mr. H. Saxon Snell, and published by Messrs. J. and A. Churchill.

General Arrangement.—The general arrangement of the establishment is shown upon the accompanying plan. The roadway between the main building and the Nurses' Home was originally a public road, but has lately been enclosed, and entrance gates and a porter's lodge (see E on plan) erected facing the end of Rackham Street. The block (A), forming the entrance to the main building, contains the residences of the Medical Superintendent, the Lady Superintendent, and the Assistant Medical Officer, and over the arched carriage way in the centre, is a chapel capable of accommodating about 250 people. Immediately opposite this entrance gateway is a block of buildings, standing centrally on the site, and containing (B) the administrative offices, and at the rear (C) the engineer's shops and the furnace and boiler rooms thereto. Adjacent is a large tower with a furnace chimney in the centre, around which winds a staircase leading to the laundry, washhouse, and drying ground, situated on the upper storeys. The mortuary and engineer's house are respectively situated right and left of this rear building. The entrance hall and the reception wards for both sexes are placed in front of the administrative offices, and from this portion of the building, running right and left, are two corridors, ten feet wide, leading on either side to two double pavilions (D) for the reception of male and female sick respectively. All these double pavilions are three storeys in height, and are similarly arranged; they consist, on each floor, of two wards, each 84 feet long, 24 feet wide, and 13 feet high, with bath room, w.c.'s, and lavatories, leading out of them at the extreme ends, but cut off, as it were, by a narrow lobby having windows for cross-ventilation on either side. All these offices are kept warmed to a higher temperature than that of the wards, not only with a view to the better comfort of the patients, but to induce a current of air from the ward through the ventilated lobbies, rather than in a contrary direction.

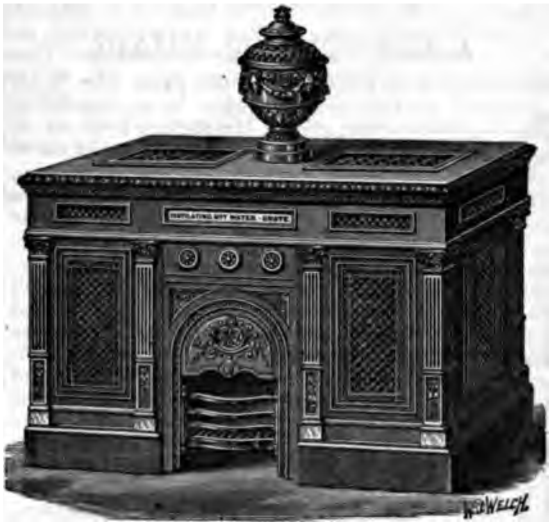
In the central portion of each of these pavilion buildings there are on each floor a day room for the patients, two nurses' duty rooms, and three small wards for the separation of special cases, also the staircase, both the steps and landing of which are supported by brickwork vaulting, thus rendering these parts of the building perfectly fireproof. The well-holes, round which the stairs wind, are enclosed by brick walls, and contain the hydraulic lifts which ascend from the ground to the upper floors. These lifts are not worked by chains, but by hollow iron rams, which descend into wells to a depth corresponding to the height to which the cages are capable of being lifted. This description of hydraulic lift is perfectly free from the dangers that have been found to attend the use of the ordinary hydraulic chain lifts.

The Nurses' Home (F) is used as a training school for nurses, and is interesting as being the first of its kind attached to a Poor Law Infirmary, and also that it is carried on under the direction of the "Nightingale," as well as the Infirmary Committee. The building is three storeys in height, and the accommodation on the various floors consists of 40 rooms, each 14 ft. long and 13 ft. wide, but one of them on the first floor is fitted up as a kitchen, and will be found useful in cases of sickness. At the ends of the corridors giving access to the various rooms, bath rooms are provided, and water-closets and slop sinks are placed in the corner towers, but they are cut off from connection with the building by means of cross-ventilated lobbies. Immediately fronting the entrance to the building, and leading out of the vestibule, is a class room, 33 ft. long and 25 ft. wide, and on either side are the apartments of the superintendent. Each of the nurses' rooms has a fire-place, and in addition, the corridors can be warmed by hot-water pipes which run along one of the side walls.

Ventilation.—The ventilation of the wards is effected by purely natural means. If any pair of beds be moved forward into the room it will be seen that, next the wall there is a skirting box with a panelled front, and that the panels immediately under the heads of the beds are formed of perforated zinc. The box is easily lifted out of its position for the purpose of cleaning, but when in its place it covers an aperture in the floor from which a ventilating pipe descends in a slanting direction to the outside of the wall, and through this pipe the external fresh air is admitted, first into the skirting box and then out of it through the perforated zinc panels (situated under the heads of the beds) into the room. Looking upwards, it will be found that the ceiling directly over each pair of beds has a perforated zinc panel running the whole width of the ward, and, on lifting a portion of this panel next the wall, it will be seen that the perforated zinc covers a channel the full depth (twelve inches) of the floor, and that this channel communicates with a large shaft running up the wall like an ordinary chimney flue. In the case of the top floors, the arrangements are similar, but the air channel runs horizontally down the centre of the ward. Now returning to the skirting box, it will be obvious that a greater part of the fresh air passing into the room through the perforated front of this box, and immediately under the head of the bed, would be drawn upwards, and passing through the perforated zinc of the ceiling panel, be conveyed through the upright flue and find an exit at its termination. It should be observed that the air in thus passing upwards from the skirting box to the ceiling, must encircle, as it were, the space surrounding the head of the sick patient, and carry away with it his or her foul emanations. Thus, therefore, each pair of beds is provided with its own separate system of ventilation, while the general ventilation of the wards is supplemented by the central stoves, described below, and also by upcast shafts in the side walls.



Fires.—The fire-grates standing in the centres of the wards are the invention of Mr. Snell. The fires are open at front and back, and the flues from them descend and pass right and left under the floors to the outer walls, in which they are continued to the chimney shafts above the roof. The novelty of their construction, however, consists of the sides, back, and top of the fires being surrounded by wrought-iron casing containing water, and at the sides of the stove there are two upright coils of pipes, through which this water, when heated by the fires, circulates. Thus the whole products of combustion are utilised for heating purposes, and it will be seen that as the water cannot attain a temperature higher than 212 deg. Fahr., the iron over which the air passes cannot, as is the case with the ordinary air body stoves, be so heated as to burn the air impinging against its surface. Another advantage offered by this plan of heating is that a vase on the top of the stove contains water which (when it is expanded by the heat of the fire) rises from the lower part, and that, in consequence of this water being warmed, a slight vapour arises from the vase, which serves to moisten the air of the wards. It should not be forgotten also to add that a channel runs under the floor to each side wall, and communicates with the outer air, thus forming a passage way for fresh air to pass from the outside round the stove and the heated coils of pipes into the room. These fire-places, known by the name of "Thermhydric Grates," are manufactured by Messrs. Potter and Sons, 44, South Molton Street, London, W.



Lighting.—The whole of the building is lighted by gas, and the burners in the wards are placed under inverted enamelled iron basins, from the upper part of which pipes, three inches diameter, are carried along the ventilated ceiling channels into upright flues in the side walls, and thus the whole of the products of combustion are carried into the outer air.

Water Supply.—The building was at first supplied by water from an artesian well, sunk to a depth of 502 feet, but from some cause it became polluted, hence the supply is now from the Grand Junction Waterworks Company. The supply is on all the principal staircases, and to other parts of the buildings where hydrants are placed for protection from fire. The upper part of the large main tower contains cisterns for the storage of from two to three days' supply. This tower also forms a chimney shaft for conveying away the smoke from the furnaces of the steam boilers, cooking apparatus, etc. Fire mains are carried through every part of the buildings, and hydrants are placed on each landing of the staircases of the pavilion wards, and also at various other parts of the building.

Drainage.—The drainage of the building is effected by means of glazed earthenware socketted pipes, laid to a fall of not less than 1½ inches to 10 feet, and carried into the newly-constructed sewer running down the centre of the roadway fronting the building. Disconnecting chambers and manholes are provided at convenient distances. All soil pipes and drains generally are well ventilated.

Numbers and Areas.—The number of sick for which accommodation is provided is 744.

The number of resident officers and servants employed by the institution is 86.

The number of non-resident officers employed, including washerwomen, scrubbers, etc., is 82.

The total number of patients and officers is therefore 912.

The area of the site is 196,416 superficial feet, or 4 acres 8 perches=$4\frac{1}{20}$ acres.

The area covered by buildings is 68,250 superficial feet, or 1 acre 2 roods 1 perch=1½ acres nearly.

The area of gardens, yards, roads, etc.=128,166 superficial feet, or 2 acres, 3 roods, 31 perches=about one-third of the whole site.

Cost.—The cost of the buildings, including the nurses' home lately erected, and all sanitary appliances, fittings, and fixtures of every description, also gas, water, and blinds, and professional fees, amounted to £130,000, or about £175 per bed; the land, including the additional ground acquired for the nurses' home, lodge, etc., cost £13,000; so that the total expenditure upon both land and buildings has been at the rate of about £193 per bed.

This building has been allowed by some of the most eminent authorities to be "the most perfect of its kind," and it may therefore be interesting to compare the above figures with the following table showing the corresponding cost of some of the principal hospitals in this kingdom and abroad; but in making a comparison of the relative cost of buildings, as shown by this summary, it should always be observed what are the dates of erection, because the prices of building materials and labour, in all cases, until the year 1880, advanced in every country 20 to 30 per cent. within the preceding 20 or 30 years. The buildings of the Herbert Hospital, for example, cost twenty years ago £330 per bed, but if erected now they would, in all probability, cost between £400 and £450 per bed. Again, the Berlin Civil Hospital authorities state that the average rise of prices during the six years their buildings took to erect was 54 per cent.

TABLE SHOWING THE COST OF VARIOUS HOSPITALS ERECTED ON THE ISOLATED PAVILION PRINCIPLE.

NAME OF HOSPITAL.	Date of Erection.	Cost of Buildings per Bed.	Cost of Land and Buildings per Bed.
		£	£
Hotel Dieu	1866–76	1,215	2,487
John Hopkins, U.S.A.	1875	866	—
St. Thomas	1868–71	777	969
Genoa*	—	654	794
Edinburgh †	1870–79	477	587
Lariboisière	1853	436	644
Menilmontant, Paris	1872–78	419	506
Berlin (Civil)	1868–74	351	—
Halle*	1876	333	374
Herbert (Military)	1860–4	330	340
Leeds	1864–69	298	326
Blackburn	1858–65	286	307

* Not completed. † Not entirely a new building.

II.—THE PADDINGTON INFIRMARY.

By THOS. SAVILL, M.D.Lond., Medical Superintendent.

The Workhouse Infirmaries of London form a very large item in the medical relief of the metropolis, an item, moreover, which has until quite recently been almost overlooked by the general public, so silently and steadily have these solid, but not unlovely, buildings grown up during the past 25 years. Nevertheless they contain an aggregate of 12,170 beds, against only 9,173 beds in all the special and general hospitals of the metropolis together. Their discipline and management is, generally speaking, excellent. They are controlled by the Boards of Guardians of their respective parishes and unions, and their administrative chief is in every case a medical man.

The Paddington Infirmary is of comparatively recent date, having been opened in the spring of 1886. It is not one of the largest, for the available ground would not permit of a larger building than would contain 284 patients. The architects were Messrs. A. and C. Harston. It is built on the pavilion principle, two pavilions, north and south, with the administrative block between, containing the offices and residential quarters, and only connected with the pavilions by bridges. Separate buildings contain the kitchen, the laundry, the mortuary, and medical superintendent's house, and the airing grounds for male and female patients respectively are adjacent. Each pavilion is a facsimile of the other. The wards also are alike, and placed one above another up to four storeys. At the end adjoining the administrative block are a lift and staircase, the ward kitchen, linenry, and a small ward for special cases. At the other end are two turrets running up the building, with a balcony at the end of each ward between. One turret contains the bath-room, fitted with fixed baths, and in some cases a shower, and lavatories; the other turret contains three w.c.'s, a slop sink, and urinal. Both of these turrets are joined on to the corners of the pavilion, as it were, by short passages with double doors. The w.c.'s are fitted with two-gallon flush cisterns and long Hopper pans, but the latter constitutes one of the few imperfections in the sanitary arrangements. Each big ward is 102 ft. long, 25 ft. broad, and 12 ft. high, contains 32 patients, and gives an aggregate of about 900 cubic feet and superficial floor space of 80 sq. ft. per bed; the minimum cubic space allowed by the Local Government Board being 800 cubic feet for sick-bed. The cubic space in the small or isolation wards is 1,000 cubic feet or more. Warming is effected by two open fire-places in the middle of the ward and by hot water pipes running up each side. The ventilation is most efficient, and is effected by means of Sherringham valves over each window, transverse hollow beams at intervals across the ceiling, deep sashes to the windows, and shutter valves behind the hob-pipes. There is, moreover, an admirable arrangement for the admission of warmed air through gratings beside the fire-places, the air being brought up in a tube beside the chimney in the ward beneath, and thus warmed. Three large steam-boilers in the basement supply steam for heating the hot water of the buildings, for culinary purposes, and for driving the laundry and other machinery. All these things are better seen than described, and the members of the Congress are specially invited to view the infirmary, which is situated at 285, Harrow Road, W., not far from the Royal Oak Station, on Friday, August 14, between 2 and 6 p.m.

The nursing staff consists of matron, assistant-matron, night superintendent, and 25 nurses, all of whom are trained; thus forming a proportion of one nurse to 10 beds.

A NEW EPIDEMIC MALADY.

THE medical members of the Congress who, in response to the invitation conveyed by our last issue, visit the Paddington and St. Marylebone Infirmaries, will have the opportunity of seeing several cases of what, in the opinion of the Medical Superintendents, Dr. Savill and Dr. Lunn, is a new malady, and probably contagious. The disease begins as a papular eruption; it then becomes vesicular, and ultimately there is a diffuse redness, with copious desquamation. So copious is the "peeling" that Dr. Savill shows visitors a cardboard box full of exfoliated cuticle, some of the pieces the size of the sole of the foot. Dr. Lunn, also at the St. Marylebone Infimary, has preserved the almost perfect cast of epidermis of the feet of a man who died in the acute stage of the disease. The peculiarity of the eruption is its tendency to become general, sparing no part of the body. A fair percentage have had the conjunctiva affected, and have been reduced to temporary blindness. In the majority the eruption has commenced on the exposed parts of the body—face, neck, arms, hands, but this is not constant. In appearance the eruption is eczematous, but the eczema must in these cases be rather considered a symptom, the outward expression of a general disease, and in its entire course, in its generalised character, and in the profuse "peeling" it certainly differs from ordinary eczema. The cases have been seen by Dr. Colcott Fox, Dr. Sisley, Mr. Wynter Blyth, and many other medical men, and all agree with Drs. Savill and Lunn as to the unusual character of the disease. Dr. Savill is busily engaged at the College of State Medicine in making cultivations of products derived from the skin, and he is said to have already obtained some interesting results, but this is a matter which requires much time, and he will wisely not communicate his investigations prematurely. The staff of both of the institutions are endeavouring, by careful analysis of the diet of the patients and the general circumstances, to throw some light upon the etiology. It is remarkable that, so far as at present known, the epidemic is confined to two infirmaries, both situated some distance from each other—St. Marylebone being at Notting Hill, the Paddington at a high point in the Harrow Road. Careful inquiry may elicit some circumstance in common to both, and coincident in point of time with the outbreak. There have been three deaths in St. Marylebone Infirmary, one of the causes being certified as "eczema," and there have been also deaths from illnesses complicated with eczema in the Paddington Infirmary; but if the disease attack a previously healthy person, it probably would not be fatal even in the most acute form. It is to be specially noted that fever or notable rise of temperature is generally absent in the cases, but there is general depression, both mental and physical.

A MODERN POLICE STATION.

IT is highly improbable, and most earnestly not to be desired, that a member of the Congress should find himself an involuntary occupant of a police station. Nevertheless, we are so frequently reminded that it is the unexpected which usually happens, that I have thought at least it would not be uninteresting to introduce to those who are not already acquainted with, and who care to know what is contained within the four walls of such a place, and very briefly to refer to the routine treatment of its compulsory tenants.

The chief station and section house of the G division of metropolitan police is situated in the King's Cross Road, adjoining Clerkenwell Police Court, at a distance of about half-a-mile from King's Cross (Metropolitan) Railway Station, and I have selected it for the purposes of this paper because it is a building of comparatively recent date, and its character is more comprehensive than the one to which I have been professionally attached (Old Street) for the past twenty-six years. The structure is a handsome and substantial one, having a frontage of about fifty feet, with an enclosed forecourt laid out as a garden, through the centre of which is the approach to the main entrance. The building consists of an extensive basement with four floors over. On passing through the entrance a visitor will at once find himself in the charge-room, a well-lighted and commodious apartment, the object which first attracts attention being the bright steel railed dock, in which prisoners are placed while the charges against them are being recorded by an inspector, who stands at a desk a few feet distant.

Opening out of the charge-room is the inspector's office, in which all official books, forms, etc., are kept, and where the officer in charge and his assistants are in constant telegraphic communication with Scotland Yard and other Metropolitan police stations. On this floor are also situated the superintendent or chief officer's room, the division office of the Criminal Investigation Department, the latter being well supplied with photographs and descriptions of offenders who are at present, or have been, "wanted"; but all, even here, is not given up to business, for this floor also contains a commodious billiard-room and library, both of which are highly appreciated by the police constables when relieved from duty.

The cells, eleven in number, are situated at the southern end of the building, and are approached by a well-lighted corridor, through the barred windows of which ample ventilation is provided. With one exception the cells are similar in size, construction, and arrangement. The exception is known as the "association cell," and is used to put several prisoners in together when necessity arises from stress of numbers. It measures 14 feet by 13, is 11 feet in height, and is lighted by two iron-barred windows.

The ordinary cells are brick-built chambers, with arched roofs, 9 feet by 6, and 9 feet high. Ventilation is provided in each by means of two strong perforated iron plates inserted over the door, and three in upper part of the door, the centre one being movable for the purposes of inspection, passing in food, drink, &c. The outlet ventilators, two in number, are of similar material, and are firmly fixed in the highest part of the ceiling. The door is iron-plated on the inner side. The cell contains no window, but over the door is a square of thick rolled plate glass, which prevents it being absolutely dark during the day, and through which light is conveyed at night by means of a gas jet and reflector. At the end facing the door, and along one side of the cell, a strong settle is fixed about 2 feet in width upon which is a canvas-covered pillow and a rug for the accommodation of those occupants whose consciences are sufficiently at ease to permit them to court the embraces of Morpheus. In the winter months the cells are kept at the uniform temperature of 60 deg. Fahr. by means of heated air admitted into small chambers built beneath the settles, the recording thermometers being placed in the corridor.

Each cell contains a w.c., the flushing apparatus of which is outside in the corridor; also an electric communicator, which rings and shows the number of the cell on an indicator in the inspector's office. The walls and ceilings are lime-washed, the floors are composed of Portland cement, but in two instances, viz., those known as the "drunk and incapable cells" are covered with raised wooden floors, having an inclination towards the doors. As will be inferred from the name, these cells are used to place persons found in a helpless state of drunkenness, and who might receive injuries from falling if placed upon the settle above-mentioned.

I may here remark that the class of cases last referred to is one which causes much anxiety, not only to the police authorities, but also to divisional surgeons, for it furnishes by far the larger proportion of street accidents, and my experience warrants me in saying that the question so frequently raised of "drunk or dying" may, in the majority of cases, be answered by the monosyllable "both."

It is an invariable rule that when a person is brought to the station who is suffering from insensibility in any degree, and from whatever cause, that the divisional surgeon shall be called and his directions acted upon. Should he be of opinion that the case is one of drunkenness simply, the person is placed in one of the cells above described, and is visited at frequent intervals by a constable told off for the purpose. When sufficiently recovered to be able to take care of himself, he is set at liberty on entering into his own recognisances to appear before the magistrate. I may further add that no prisoners who can obtain the requisite bail are detained in the cells of a police-station, except those charged with serious felonies.

That portion of the station used for residential purposes by members of the police service is called the section-house, and on the first floor we find the quarters of two married inspectors, an excellent reading-room, some sleeping apartments which, with the two commodious floors above, provide dormitory accommodation for 80 unmarried police-constables, and to whose further creature comforts the basement is entirely devoted. Here may be found a commodious kitchen, an excellent mess-room (to which all in residence must subscribe), bath accommodation, boot and locker rooms, drying-rooms for clothing, accommodation for hanging clothing not in use, etc., etc.

The total number of inspectors, sergeants, and constables attached to this station is 240, and they are under the professional charge of my friend and colleague, Dr. J. A. Miller, of Percy Circus, and who, of course, is also called to the station to attend all casualties.

In conclusion, allow me to refer to the yard in the rear of the premises, for in it all cabs, omnibuses, etc., plying for hire north of the Thames are inspected before being licensed. There is stabling for several horses, standing for a police van, and an ambulance carriage, used for removal to hospital of all cases of infectious disease occurring amongst Metropolitan Police in the station houses or at their own homes. Here, also, are kept the stretchers used to convey persons in charge of the police to the hospitals, stations, etc. The old form of stretcher is now rarely used, being superseded by the hand ambulance, two of which are kept at this station, and one of the form known as the St. John Ambulance Association Ambulance.

I trust from what I have written a fair knowledge may be gained of the innumerable advantages possessed by the modern police station over the watch-houses of old London.

G. E. Yarrow, M.D., D.P.H.,
Medical Officer of Health for St. Luke's, Middlesex; Divisional Surgeon of Police, etc.

Medical Officers of Health and Tenement Dwellings.—Under the Customs and Inland Revenue Act, exemption from house duty can only be obtained in the case of tenement dwellings upon a certificate granted by the medical officer of health of the district in which the dwellings are situate, that "due provision" has been made for the sanitary requirements of the tenants, and that the house for which the certificate is required is "so constructed as to afford suitable accommodation for the families or persons inhabiting it." In inspecting premises for the purpose of giving a certificate, medical officers of health generally have insisted upon defects of construction being remedied—defects which in many cases could not be remedied by the powers under the Sanitary Acts. The property owners thought that the certificates would be given as a matter of course, and find instead that an application for a certificate involves a complete inspection, and, if anything is wrong, a considerable outlay. The London Freeholders and Leaseholders' Defence Association have just presented a memorial to the President of the Local Government Board. The memorialists urge that medical officers of health have wholly misconceived the intentions of Parliament. The certificate, they allege, was called into existence for the purpose of excluding "slum property" from the benefits of the Act, and not well-built dwellings, the owners of which have complied with all the requirements of officials under Local Sanitary and other Acts." The memorialists complain that in many cases medical officers of health have declined to give a reason for the refusal of the certificate, in which cases the owners are unable to remedy the alleged defects; and, further, that much diversity of opinion prevails amongst medical officers on the subjects of "house construction" and "necessary sanitary requirements." The president of the Local Government Board is urged, in order to remove "the very great feeling of alarm and dissatisfaction amongst owners of tenement dwellings in all parts of the country, caused by the action of medical officers in carrying out the Customs and Inland Revenue Act, 1990, and to remove the deadlock which has already arisen, and to provide against a similar state of things in the future," to institute an appeal from medical officers' decisions. It is stated that property to the value of several millions is affected by the above Act.

VOLUNTEER MEDICAL ASSOCIATION AMBULANCE COMPETITION.

A considerable number of members of the Naval and Military section of the Congress attended at the Wellington Barracks, Birdcage Walk, on Saturday afternoon, to witness an ambulance competition for the possession, for the year 1891, of the silver shield presented by the Volunteer Medical Association. During the past week preliminary selective competitions have been going on in various parts of the country, resulting in the following teams being left to take part in the final contest:—1st Middlesex Engineers, 20th Middlesex (Artists), 2nd Volunteer Battalion Royal Fusiliers, 1st Tower Hamlets R.V., 2nd Volunteer Battalion East Surrey, 1st Volunteer Battalion Royal Sussex, 1st Volunteer Battalion Royal Berkshire, 1st Bucks R.V., 3rd Volunteer Battalion the Welsh Regiment, 1st Notts Robin Hood R.V., 1st Volunteer Battalion Royal Warwick Regiment, 2nd Volunteer Battalion Hampshire Regiment, 3rd Volunteer Battalion Hampshire Regiment, 1st Hereford R.V., 4th Volunteer Battalion Royal Highlanders. The tests consisted of—(1) Stretcher drill; (2) Illustrations of methods of rendering first aid to the wounded, a gunshot wound of the right breast and wound of the right femoral artery being the two conditions supposed to exist; and (3) Methods of lifting and carrying the wounded with formation of two, three, and four-handed seats. The judges were Surgeon-Commandant Norton, Volunteer Medical Staff Corps; Surgeon-Major Smith, Volunteer Medical Staff Corps; Surgeon Bedford, Army Medical Staff, assistant instructor, Depôt, Aldershot; Surgeon Whiston, A.M.S., attached 2nd Coldstream Guards. The competition was a most keen one, the struggle eventually lying between the 2nd Volunteer Battalion Royal Fusiliers and the 2nd Volunteer Battalion East Surrey, and it was only after repeated tests that the selection was at last made, and it was announced that the Royal Fusiliers had topped their rivals by four points, the numbers being: Royal Fusiliers, 97 points; East Surrey, 93 points. The shield, which, it is stated, cost 250 guineas, is both handsome and massive; the centre has a raised cross, and it bears, with the signatures of the president, treasurer, and secretaries, the following inscription: "Presented by the Volunteer Medical Association with the view of encouraging ambulance instruction and drill in the various regiments of yeomanry cavalry and the volunteer force. This shield to be competed for annually by regimental stretcher detachments representative of the corps comprised in the yeomanry cavalry, the artillery volunteers, the engineer volunteers, and the infantry volunteer battalions, 1st January, 1891. It is proposed to engrave upon the shield each year the name of the winning team for that year. The 2nd Volunteer Battalion Royal Fusiliers have, therefore, the honour of taking first place on the proposed list as winners for the year 1891.

A Visit to Osborne by the Foreign Delegates.—On Thursday, the 13th, about forty of the foreign delegates and Indian delegates will, by special invitation of her Majesty the Queen, visit Osborne. They will go by special train, and then by her Majesty's yacht, returning probably by Southampton.

SAMARITAN FREE HOSPITAL FOR WOMEN AND CHILDREN.

By Alban Doran, Esq., F.R.C.S.

The new building of this celebrated institution stands in the Marylebone Road near the Marylebone Baths. It is an imposing edifice in red brick, faced with terra cotta. The foundation-stone was laid by the Prince of Wales in July, 1889, and the hospital was opened for patients at the end of September, 1890. It is ventilated through the glass roof at the top, and also by a shaft at each end. The sewerage is carried out according to the most approved modern principles. All animal and vegetable *debris* is burnt in a furnace. There are 53 beds—28 surgical and 25 medical.

The "medical" work at this hospital includes all cases of diseases peculiar to women which are to be treated by drugs and palliative measures, and also cases where operations on the lower or external part of the genital tract are performed. A special operating theatre is at hand for the latter class of cases, the patients inhabiting general wards.

The purely surgical work includes all operations requiring abdominal section, such as ovariotomy, hysterectomy, and removal of the uterine appendages for the cure of fibroid disease and other affections, also a few other surgical procedures for diseases more or less limited to the female sex. The patients are received in a general or "convalescent" ward, so-called because they return to it after recovery from operation. Special wards are reserved where the operations are performed, each of these wards having one bed only for a patient and one for a nurse. When the patient is well enough to be removed, she is sent back to the convalescent ward, and the special ward is thoroughly cleansed and made ready for another operation. The system just described was established by Sir Spencer Wells, who has made the hospital celebrated, by his work from 1858 to 1878, and is continued by the surgeons who have succeeded to him. The results in ovariotomy have been most gratifying. The mortality of this operation for the years 1888, 89, and 90 did not exceed 5.55 per cent. (11 in 198). The fact must not be forgotten that a large number of ovariotomies on cases which are, or promise to be, simple, are undertaken by general surgeons and practitioners, even in remote country districts, complicated cases being sent to large hospitals, and especially to the Samaritan, on account of the reputation of its staff, hence the above total of 198 includes an abnormally high proportion of serious or advanced or neglected cases. During 1890, 513 in-patients were treated at this hospital, 322 being medical and 191 surgical cases.

The out-patient department is a distinct and separate building. It consists of a large waiting-room, consulting-rooms, dispensary, and a refreshment-room, where milk, tea, bread and butter, etc., may be obtained by the patients at small cost. This arrangement was made on account of the large number of patients who arrive early from great distances, and cannot reach their homes till late. Children, as well as women, are treated in this department; 5,438 out-patient cases were under treatment during 1890. Notwithstanding the many improvements lately made in this department, the accommodation is utterly inadequate, and before long this portion of the hospital will have to be rebuilt.

Qualified medical practitioners only are admitted to attend the practice of this hospital, which is greatly frequented by physicians and surgeons from the country and abroad, especially America.

Drainage.—It not being found possible to drain to the rear of the hospital, nevertheless external drains in the areas in front and rear have been adhered to as far as practicable and within the hospital; the corridors have been utilised so as to avoid passing beneath a single room of any importance; straight lines have been carefully observed from point to point, where manholes or sweeping eyes provide free access to every foot of ground, facilitating periodic inspection and cleansing as may be required. In the front area is situated a large manhole with disconnecting trap, and air inlet, which, in conjunction with extract ventilators (forming the termination of soil-pipes on the three principal branch drains, and carried up full size above the roof level), ensure a continuous circulation of fresh air throughout the entire drainage system. Under the building the drains are of special heavy cast-iron with lead-caulked joints, otherwise the pipes are of stoneware, made from the best Dorset clay at Mr. Jennings' Pottery Works, and specially tested by hydraulic pressure; these are carefully jointed in cement, and the whole are laid on a concrete bed to an even gradient, an adequate fall having been secured. All baths, lavatories, sinks, and other wastes are "disconnected" by discharging over properly-constructed gully traps, and ventilated by their extension full size above roof. Ample flushing is ensured many times daily by the waste water from the hydraulic lift, which discharges upwards of 200 gallons through a four-inch pipe into the main drain each time it is used. Water supply to the building is constant, but in addition there is a storage of about 4 000 gallons in order to provide against any contingency.

Ventilation.—The ventilation of the wards and other rooms is provided for by sash windows, having fan-lights above, regulated by patent gearing, by which they can be easily adjusted by the inmates. Fanlights are also provided over the doors for inlet of warmed air from corridors. The foul air being extracted from various rooms by mica flap gratings into flues. The entrance hall, staircases, corridors, passenger and dinner lifts are efficiently ventilated by Boyle's patent air pump ventilators in roofs. Inner and outer skylights are also made to assist the ventilation of the building by openings through them, and flaps which are regulated by lines and pullies. The warming of the building is effected by means of low pressure hot-water pipes and coils distributed about the staircases and bath-rooms, and are regulated by bye passes, according to the state of the weather. The furnaces for these and for supply of hot water to baths, lavatories, etc., are in a vault detached from the building, which also serves for the "Crematory." A room for airing linen is also provided, and fitted with six horses running on trams in a heated chamber. The kitchen has been fitted with the most improved apparatus. The range being one of Chambers' close ranges, having two tiers of ovens, and is fitted with boilers for supplying steam for cooking vegetables, hot closets, and other purposes.

THE MARYLEBONE BATHS AND WASH-HOUSES.

By R. U. EVENS, Esq., Chairman of the Commissioners and Chairman of the Sanitary and Sewers Committee of St. Marylebone.

To those who regard cleanliness in person and linen as important in regard to health, the Public Baths and Wash-houses of London must always be regarded with respect, and it may be interesting to the members and delegates of the Congress of Hygiene and Demography to learn some details in connection with one of the oldest and, I think, best regulated of those institutions, I mean that of St. Marylebone.

Situated at the western end of the Marylebone Road, with a frontage also in Seymour Place, it is easily accessible from all parts of the parish by those who wish to enjoy the splendid swimming baths, and it ministers to the needs of the densely-populated neighbourhood of Lisson Grove in respect of the facilities it affords for washing. Let us take a turn round the establishment, beginning with the swimming baths. The First class bath is decorated in a really handsome manner, perfect order and cleanliness prevails, a dressing-room with brushes and combs is provided, and, most important of all, the bright clear water speaks for itself, and tempts the beholder to plunge into it. I know no finer sight than that of half-a-dozen young men in the grand vigour of their first years of manhood struggling for the mastery in a race of 100 yards in this bath! Such a spectacle may be witnessed very frequently in the evening when the members of the various swimming clubs in the neighbourhood meet.

The charge for admission to this bath is 8d.; five tickets may be had for 2s. 6d., besides which, a further reduction is made to purchasers of books of 200 tickets and upwards. Then there is a ladies' swimming bath, admirably arranged for the comfort of those fair ones—and their number, I am glad to say, is increasing—who enjoy the delightful and healthy exercise of swimming.

Next we reach what is known as the Fourpenny Swimming Bath, which is provided with a large number of dressing boxes, not one too many towards the evening in the summer time, and reductions are made here also to purchasers of large numbers of tickets. Last of the swimming baths is the twopenny one, and in the early and late parts of the day it literally swarms with boys and young men, whose behaviour, considering the class to which they belong, is excellent.

Now we come to the private warm baths, divided into first-class for men and women, charge sixpence, and a second-class ditto, charge twopence; each of these departments is in charge of an attendant, who arranges the temperature of the bath according to the wish of the bather. Needless to say, bathers are provided with all necessary towels, brushes and combs, etc. In this department is a Smeaton's vapour bath, a veritable *multum in parvo*, and much used by those suffering from rheumatism and kindred complaints.

But the department which during the past three or four years has engaged the attention of the governing body is the Laundry. There considerable improvements have been made, with the object of enabling it to meet the growing requirements of the poor people in the vicinity. Steam machinery for wringing has been provided, saving an immense amount of arduous labour that used to be done by the women themselves, together with modern appliances for drying; in fact everything has been done to make it what it really is, a model public laundry. So great is the appreciation of the new order of things, that during the year ended March, 1891, 39,232 women used this laundry, and I may add that during the same period, 147,909 bathers used the other parts of the establishment.

There is a superintendent, Mr. Marchant, and his wife, the matron, both most energetic and zealous in the discharge of their multifarious duties.

The institution is governed by seven commissioners who are elected by the vestry, and the only reward that they get, or that they seek, for their anxious labour, is the consciousness that, with such important functions committed to their charge, they have done their best in the interest of those for whose benefit the Institution was brought into existence.

ARTIFICIAL WINE.—In the case of wine for drinking (not distilling) the art of making it from materials other than grapes has advanced to a state of perfection. Red wine is made out of or mixed with white wine, and coloured according to fancy, while white wine is made with barley. This barley wine can be made to resemble almost any good wine in flavour, since the discovery (made, I believe, by Monsieur Pasteur) that the bouquet and style of a fermented liquor is not derived from the material of which it is made, but from that which is used in fermenting it. Therefore it follows that if wine is made from raisins, currants, barley, or any other material, and is fermented with must or barm from any particular grape, the wine will have the bouquet of that vintage. Following up Monsieur Pasteur's discoveries, other persons have arrived at some interesting results. Monsieur George Jacquemin has succeeded in producing delicious wines without any grapes at all. In 1887 he was able to make an excellent wine from barley, which he fermented with barm from Sauterne and Barsac grapes. In 1888-89 he continued his experiments, and produced from barley, under the influence of barms from Beaume, Chablis, Ay, and other grapes, wines said to have all the characteristics of these vintages. Last year he reared artificially barms of these vintages, and used them successfully in the same way. And, finally, he discovered that if the wines so made are distilled, the most excellent brandy is obtained having the flavour of each different grape, and all from barley.—*Consular Report on the Trade of Nantes.*

THE DISTRICT OF ST. JAMES.

By Dr. Edmunds, Medical Officer of Health and Public Analyst.

The district of St. James's, Westminster, is mainly absorbed by leading West-end shops, and during the last decennium its sleeping population has decreased from 29,941 in the year 1880, to 24,993 in the year 1890. This decrease is due to the continuous absorption of its area for business purposes. The district covers an area of 162 acres.

The sanitary staff consists of one medical officer of health, who also holds the office of public analyst, and two sanitary inspectors, all acting as officers of the vestry. Regulations by the vestry are in force for tenement houses. A block of dwellings for the poor was built by the vestry in 1877 out of trust funds, not out of the rates. Continuous improvement is going on in the sanitary condition of the poorer houses in St. James's, and the pressure put by the authorities upon insanitary arrangements is being continuously increased.

The urinals throughout the parish used to be supplied with a constant stream of water, but of late automatic flushing apparatus has been fixed, which can be regulated so as to empty its cistern in one rush, at intervals of six, ten, or any other number of minutes. The urinals are thus efficiently flushed, and at the cost of less than half the water formerly used. The parish contains ten of these public urinals, which, in 1890, cost for water £49 14s. 3d., and for wages in cleansing £62 8s., a total cost of £112 2s. 3d. for the ten efficient public urinals.

A large public lavatory, with urinals and closets, for the accommodation of both men and women, has been constructed underground at Piccadilly Circus by the vestry. This lavatory has been a vast public convenience, and will probably be the model for other conveniences of the same kind in other parts of London. It has been more than self-supporting. During the year ended March, 1891, the men's closets have been used by 215,467 persons, and the ladies closets by 164,275 persons; the men's lavatory (which was only opened on September 26th, 1890) by 3,076, and the ladies' lavatory by 2,413. No record is kept of the use of the urinals, for which no charge is made, but it is estimated that some 2,600,000 men have made use of them during the twelve months. The staff consists of two male and two female attendants, and two boys, alternate duty being taken every nine hours. The fees received during the year for the use of the closets amounted to £1,574 7s. 4d., and for the lavatories £44 19s. 11d., making a total receipt from the Piccadilly conveniences of £1,619 7s. 3d. The total cost for officers' wages and repairs has been £566 0s. 1d., leaving a profit of £1,053 7s. 2d. towards the cost of other sanitary works in the parish.

The parish contains public baths and wash-houses in Marshall Street.

A public mortuary was erected in 1876 by the vestry at a cost of £326 16s. 3d.

A public disinfector was erected in 1885 at a cost of £277 2s. 6d., the apparatus chosen being that known as Lyons. This consists of a double coated steam chamber, the central space receiving the articles to be disinfected, and in which they are exposed to steam at a considerable pressure. The outer chamber is then filled with high pressure steam, while the inner one has its communication with the air opened until the whole of the condensed water has been boiled out of the clothing or bedding, and these articles are thus perfectly dried in a few minutes. The apparatus is perfectly efficient—cheap, facile, and safe in working. It is supplied with steam from the boilers of the baths and wash-houses.

The sanitary officers in St. James' have always had the cordial support of the vestry in their work of improving the condition of the district, and the active co-operation of its eminent and well known vestry clerk (Harry Wilkins, Esq.), who will be glad to have prepared any data which may be of service to members of the Congress.

It will give me much pleasure to show or explain the working of any of the sanitary arrangements of St. James'.

8, Grafton Street, Piccadilly.

Stoke Drainage.—Mr. Buckham, Mem.Inst.C.E., has collected information upon the Shone system from twenty places where the system is in operation. The replies received to his questions leave him "still of opinion that there is no other plan known to sanitary engineers that would so effectively meet the case of Stoke as this Shone system." The estimated cost is just over £12,000.

Division II. Demography.—In this division the president, Sir Douglas Galton, will be supported by the following honorary presidents: Dr. Jacques Bertillor, France; Dr. R. Böckh, Germany; Professor L. Bodio, Italy; Dr. A. Chervin, France; Dr. Carl T. von Inama Sternegg, Austria-Hungary; Professor Jules Jahnson, Russia; Dr. Josef Körösi, Austria-Hungary; Dr. Georg Von Mayr (Munich), Germany; Dr. W. E. Milliet, Switzerland; Dr. Enrico Raseri, Italy.

Wolverhampton Corporation Bill: Sanitary State of Brownhills.—In presenting an important report from the Sanitary Committee, Mr. W. G. Bagnall said it would be seen that the power of the Council had been morally strengthened rather than hampered by the Opposition as regarded the Wolverhampton Corporation Bill. The Sanitary Committee might send a qualified representative at any time to see how the scheme was being carried out, and if not satisfactory they might make representations to the Local Government Board, who should send down an inspector with power to cancel any certificate the Corporation of Wolverhampton might then hold. It would certainly appear that the Wolverhampton authorities intended to grapple satisfactorily with their difficulties. With regard to the water supply of Robins Row, Walsall Wood, and Clayhanger Brook, in the Brownhills Urban District, the committee recommended that it should be represented to the Board that the Public Health Acts had not been properly put in force within the district of the Brownhills Local Board.—This was the first time such a proposal had been made by the committee, and in support of it Mr. Bagnall quoted reports of the county medical officer of health and the medical officer to the Brownhills Local Board. It appeared that from certain cottages fever had rarely been absent for years, and yet the well impugned was still in use. A member of the Local Board had said that if a certain well were condemned, the water from three-fourths of the wells would be condemned. This meant, Mr. Bagnall said, that rather than face the difficulty it was the opinion of the members of the Board that the people should continue to drink diluted sewage. The county medical officer's report was that some of the places were in a deplorable condition, and it was clear that for three years the authority had been aware of the condition of the cottages in a certain district of the area. The report was adopted.

REPORTING A LOCAL AUTHORITY.

The County Council of Stafford is the first of the county authorities which has been compelled to make a formal report under section 19 of the Local Government Act, which section provides for the forwarding of the report of each local medical officer of health to the County Board, and "if it appears from any such report that the Public Health Act, 1875, has not been properly put in force within the district to which the report relates, or that any other matter affecting the public health of the district requires to be remedied, the Council may cause a representation to be made to the Local Government Board on the matter." In this instance the Brownhills Local Board is in default; and the circumstances, as detailed by Mr. Bagnall, the chairman of the Sanitary Committee of the Council, are as follows: The county medical officer (Dr. Reid first reported upon the district in question on December 20th last, when he called attention to the dangerous character of the water supply of Horobin's Row, and pointed out that, owing to the existence of scarlet fever in certain cottages, the matter was one of great urgency. He stated that the condition of the cottages as regards water supply had more than once been reported to the local authority by the medical officer of Health, and that the continuance of the fever, which had rarely been absent from the cottages for years, was in all probability in no small measure owing to the fact that the families even of infected houses were in the habit of drawing water from a shallow and open well by means of their own buckets. Further complaints had since been made by Dr. Reid. From a newspaper report of a meeting of Brownhills Local Board on June 17th, it appeared that when considering a communication from the Sanitary Committee a member of the Board contended that if there was an analysis of the water from one well there ought to be very many more, and that if the water from a certain well was condemned the water from three-fourths of the wells would be condemned. He moved that the Board were satisfied, which was seconded and carried unanimously. That simply meant that rather than face the difficulty where there was such extensive pollution the people should continue to drink diluted sewage. The Medical Officer of Health for the district, in his annual report for last year, urged upon the Board the great need which existed for a more plentiful and pure supply of water. In some cases he found there was no supply at all; in others it was very far from being what it should be. He went on to give numerous instances in which the water was impure and contaminated by sewage, with cesspits and pigstyes within a few feet of the wells. The County Medical Officer, Dr. Reid, commenting upon the report of the District Medical Officer, said: "Strong as these remarks are, they fail to convey an idea of the truly deplorable condition of the houses in question, and yet I am told that this is a sample of other parts of the district." For over three years the local authority had been aware of the condition of the cottages in question.

It will be interesting to know the result of this first representation. We presume that the Local Government Board will consider that the representation amounts to a "complaint" under Section 299 of the Public Health Act, 1875, which gives the Local Government Board full power to compel a local authority to do their duty by order, and if the order is not obeyed, to enforce the order by mandamus, or to appoint some person to do the work.

The Citron.—The value of citrons shipped from Mogador in 1890 was £592. Of these the larger proportion may be taken to consist of the ordinary citron of commerce, a very large and thick-rinded fruit, often of curiously irregular shape, some being even of bifurcated or trifurcated form. These, going home in casks in brine, are converted into "candied peel," while a good many are locally used in native households as preserves or crystallised fruit. But there is also a curious, rare, and highly esteemed holy fruit of this genus, which, as mentioned in my commercial report for 1883, is sold here at an average of perhaps 4d. per fruit, yet appears never to be eaten. This may be spoken of as the sacred or holy citron of the Jews, which is carried to their synagogues at the feast of tabernacles, it having an emblematical significance. So highly prized is this fruit by the faithful observers of Israelitish tradition that specimens without blemish sometimes fetch as much as 4s each here, while in England they are sold in certain synagogues for the extraordinary price of one guinea to two guineas each. Their use is supposed to be derived from injunctions contained in the 23rd chapter of the book of Leviticus: "And ye shall take you on the first day the boughs (Hebrew version, fruit) of goodly trees, branches of palm trees, and willows of the brook." But the Jewish version of the same passage reads: "And you shall take to yourselves on the first day the fruit of the tree hadar, palm leaves, boughs of the tree aboth, and willows of the brook." These special fruits, boughs, etc., are particularised in a Jewish book, entitled "The Festivals of the Lord," "as fruit of the tree hadar, or citron (Hebrew troon), the 'capoth temarim' or palm leaves, boughs of the tree aboth or 'myrtle,' and brook willows." The "troon" or "tabernacle citron," as it is sometimes called, is a fruit rather larger than a lemon, pale greenish-yellow in colour (being always plucked before it is fully ripe), and said to contain only one pip, and to be of an extremely pure nature, and to keep sound for a very long period. Those which are dispatched hence are carefully packed in cotton wool or other soft material, as the price which they will realise for their holy use is entirely dependent on the greater or less freedom from blemish which the priests can certify concerning each specimen. Inquiry as to the exact locality of their production has resulted in fixing it at a place called Assats (sometimes Assat), which is in the province of Soos, at no great distance (some say half a-day, some say a-day) from the town of Tarndant, and on or near the bank of the great Soos River. It is stated with regard to this interesting place that there is a very ancient Hebrew graveyard there, and orchards known by the names of Moses, Aaron, David, etc., also that the authority of the Moorish Government is not respected there. Jewish informants here have said that these "troons" come from no other place but Assats; but they have been unable to explain how the faithful Hebrews in many far distant parts of the world manage to provide themselves with these necessary emblems—the shipment of which from Mogador in one year amounted to 110 boxes, containing 9,024 specimens of this interesting vegetable production.—*Consular Report*, 1890. *Trade of Mogador.*

The Maharajah of Vizianagram.—With the approval of the Prince of Wales, the Maharajah of Vizianagram has been appointed a Vice-President of the International Congress of Hygiene and Demography. The name of Rao Bahadur Runchorelal Chotalall, of Ahmedabad, has been added to the list of Honorary Councillors of the British Empire.

THE SANITARY INSTITUTE.

Parkes Museum, 74a, Margaret Street, Regent Street, W.

When the various statutes relating to sanitation and public health were consolidated by the passing of the Public Health Act of 1875 it was felt that the increasing importance attached to sanitary science, and the recognised position it was assuming in the public mind, justified the formation of a national society, the object of which should be to devote itself *exclusively* to the advancement of all subjects bearing upon public health. In furtherance of the object, a meeting was held at St. James's Hall, on July 13th, 1876, at which His Grace the Duke of Northumberland presided.

This meeting resulted in the formation of the Sanitary Institute of Great Britain, having for its object the advancement of sanitary science and diffusion of knowledge relating thereto.

The promoters of the Society felt that the wise provisions of the Public Health Act would lose much of their beneficial effect if the officials upon whom devolved the duty of carrying out the provisions of the Act had not the requisite technical and practical knowledge, they therefore instituted a system of voluntary examinations and granted certificates for local surveyors and inspectors of nuisances.

In order to lead to an interchange of opinions and the diffusion of sanitary knowledge throughout the country annual congresses were established in various provincial centres, at which the leading sanitarians from all parts of the kingdom met to read papers and to discuss the various sanitary problems of the day.

In connection with these Congresses was held an exhibition of sanitary apparatus and appliances, and medals and certificates were awarded after careful examination and practical testing of the exhibits.

The main object of these exhibitions was to stimulate the improvement of sanitary appliances, and to bring under the notice of provincial towns sanitary improvements adopted in other parts of the country; but in addition to this, a carefully classified list of the awards was published, which served as a guide to the public in the selection of sanitary appliances. Meetings were also held in London, when addresses and papers on sanitary subjects were read and discussed.

In 1883 the Sanitary Institute of Great Britain transferred its office to the Parkes Museum of Hygiene, and worked in co-operation with that Society, although for several years afterwards the management and financial arrangements of the two institutions was kept distinct.

The Parkes Museum was founded at a meeting presided over by Sir William Jenner, Bart., M.D., F.R.S., on July 18th, 1876, in memory of the late Edmund Alexander Parkes, who was the first Professor of Hygiene in this country. He was appointed to the Army Medical School, established in 1860, by the late Lord Herbert, of Lea.

Her Majesty the Queen and other members of the Royal Family were among the first subscribers to the funds of the new institution.

In 1877 the Council of University College placed commodious galleries at the disposal of the committee of the museum. These galleries were soon filled with objects illustrating various branches of the science of hygiene, and on June 28th, 1879, the museum was formally opened to the public by the Right Hon. Sir R. A. Cross, G.C.B., Secretary of State for the Home Department.

In 1880 a public meeting was held at the Mansion House, under the presidency of the Lord Mayor, in support of the museum. This meeting led to a considerable increase in the number of subscribers, and several of the City companies contributed to the funds of the museum. A second meeting at the Mansion House was held in 1885.

On the occasion of the meeting of the International Medical Congress in London, in 1881, the committee of the museum organized the International Medical and Sanitary Exhibition, which was held at South Kensington, in the buildings of the Commissioners of 1851. This exhibition was the first of its kind in London, and was the precursor of the great Health Exhibition of 1884.

In 1882 the museum was incorporated, and His Royal Highness the late Duke of Albany became its first president. As, however, the Council of University College now required for other purposes the galleries they had lent to the Museum Committee, it became necessary to make new arrangements for housing the collection, which by this time had considerably increased. The museum was accordingly removed to the new premises in Margaret Street. About £1,500 was expended in adapting the premises to the requirements of the museum, the drainage and other arrangements of the building being especially designed and constructed so as to be available for teaching purposes.

In 1883, on May 26th, the President, His Royal Highness the Duke of Albany, opened the museum in its new premises, and delivered an address, of which the following were the concluding words: "Our endeavour will be to make the Parkes Museum in every way worthy of the man whose name it bears. To do this, we look for the ungrudging and cordial support of all who are interested in sanitary progress. If such support be accorded us, we may fairly hope that the museum will help materially in the dissemination of that branch of knowledge which, in the words of Dr. Parkes, aims at rendering 'growth more perfect, decay less rapid, life more vigorous, and death more remote.'"

The first year during which the museum occupied its new premises was mournfully marked by the death of its President, an event which was a serious blow to the progress of the institution, for His Royal Highness had the interests of the museum deeply at heart, and spared no effort to render it worthy of the objects for which it was established.

A large number of practical demonstrations and lectures have been given from time to time in the museum.

In 1886 courses of training lectures suitable for students preparing for the examinations of the Sanitary Institute, were established, and carried on with great success. The museum has also been placed at the disposal of teachers of hygiene, a privilege of which the colleges and medical schools, as well as private teachers, have largely availed themselves.

The reading-room, with its valuable library of sanitary literature, has always been a distinguishing feature of the museum, and its importance was greatly enhanced by the addition of 1,500 volumes contributed by the Council of the International Health Exhibition.

For the further development of the useful work carried on by these two societies—The Sanitary Institute of Great Britain and Parkes Museum—it was thought desirable to amalgamate them under one title, and a new Memorandum of Association was obtained under the shorter title of the Sanitary Institute, the maintenance of the Parkes Museum being one of the objects of the new society.

Since the amalgamation, the development of all the different works initiated by the two old societies has been rapid and successful.

The members and associates of the Sanitary Institute now number nearly 1,100.

The number of candidates attending the examinations has so largely increased that it has been found desirable to hold the examinations annually in different centres throughout the country, in addition to those held twice a year in London, and in conjunction with some of the County Councils the Institute is also arranging training lectures for sanitary inspectors to precede these provincial examinations.

The museum has been considerably developed, and a handsome donation from Mr. Rogers Field, M.Inst.C.E., has enabled the Council to produce a new catalogue, and to make some considerable re-arrangement of and addition to the exhibits.

There is a continuous water supply, and many of the most approved forms of sanitary apparatus, consisting of closets, water-waste preventers, flush tanks, etc., are arranged in a separate corridor, and may be seen in operation.

Various forms of drain pipes, soil pipes, disconnecting apparatus, and models of systems of drainage are on exhibition.

Numerous methods of ventilating, warming, and lighting are exhibited.

Stoves, fire-places, and gas stoves, which combine recent hygienic improvements, are in use in the museum, and others are on exhibition. Cowls and terminals for chimneys, air shafts, and drain ventilators, are on view.

Specimens showing methods of, and materials for, house construction, as well as materials applicable to the treatment of walls, floors, and ceilings are exhibited, together with models and plans of dwellings, hospitals, and other buildings. Among these may be mentioned:—

House Sanitation (full-sized model), showing a ventilated soil pipe and two closet branches, one of which is connected to a lead trap, and the other to a stoneware trap, and both provided with two-inch anti-syphonage pipes. The soil pipe is connected to a four-inch stoneware pipe drain. The method of making this important joint is shown in section, the joint is illustrated as being above the ground level, and thus open to inspection. The drain is made with four-inch tested pipes, with ordinary cemented spigot and socket joints, one portion being bedded *on* concrete, and another portion embedded *in* concrete. The drain (ten feet in length) being laid with a fall of seven inches, and terminates in an inspection chamber constructed with cement floor, glazed channels, glazed brick lining, and covered with a model air-tight cover. Representations are also given of a three-inch rain water pipe (in galvanized iron), a two-inch ventilated bath waste (in lead), with lead trap and bath plug and union, and a two-inch lavatory waste with hopper head (in galvanized iron). These are collected and discharged into an ordinary glazed stoneware gully with outlet, connected by four-inch drain to the inspection chamber. The inspection chamber is provided with fresh air by means of a flue constructed in four-inch earthenware pipes, carried below the ground level to a wall near, and terminated with a nine-inch by nine-inch grating. An intercepting trap is fixed at this point, with well of trap inside the inspection chamber, and provided with an inspection arm for access to the six-inch drain beyond trap to sewer. This arm is securely stopped with a stanford jointed stopper, and the trap is so fixed as to be seen in section, from the channel of inspection chamber to the connection with the six-inch drain. This model occupies about 18 feet on the north side of museum, and is open to inspection in all its details. A diagram, with full particulars, is placed near the exhibit, and a copy of the same will be found in this catalogue.

The museum contains an admirable collection illustrating the constituents and preparation of food, arranged by Mr. Thomas Twining, of Twickenham.

The museum is open free every day in the week, in order to afford to all classes an opportunity of availing themselves of the instruction it affords.

The whole purpose of the museum is to serve as a means of practical demonstration and teaching for sanitary science, and is not designed as an attractive exhibition. In size and scope the present building is far behind what is felt to be desirable, and even necessary, for complete practical teaching in hygiene, but as the museum is not in any way subsidised by State, but is supported entirely by the donations and subscriptions of private members, the Council are much encouraged by the progress already made, and hope that in the future it may grow into a still more useful and representative society.

Douglas Galton, K.C.B., F.R.S.,
Chairman of Council.
G. White Wallis, Secretary.

*The Parkes Museum, 74a, Margaret
Street, London, W.*

Parish of St. George, Hanover Square, and the Census.—Dr. W. H. Corfield, the medical officer of health, in his report for the five weeks ending July 4th, states that the total number of deaths in this parish during that period was 181. Of these, 69 were non-parishioners, and as 11 parishioners died in public institutions outside the parish, the number of deaths of parishioners is brought to 123. This gives a death-rate of 14·33 per 1000 per annum, as against 13·25 in June, 1890, the increase being due to influenza and its *sequelæ*. The report also states that the death-rate has been calculated on the census of 1881, and not on that of 1891, as the circumstances under which the latter was taken deprive it of statistical value, for it applied to the persons sleeping in the parish on the night of Sunday, April 5th, when the usual Sunday number of people sleeping out of town was increased by the fact that it was the Sunday after Easter, and many persons had not returned from the holidays. For this reason the census of 1881 will be used in estimating birth-rates and death-rates until a new and more correct enumeration takes place, which Dr. Corfield hopes will be in 1896. The population of this parish, which remained practically stationary between 1871-81 at 89,758 and 89,573 respectively, fell, according to the 1891 census, to 78,362, showing a decrease of one-eighth, for which, the report says, no reason can be assigned.

SKETCH OF THE ORIGIN AND PROGRESS OF THE SOCIETY OF METROPOLITAN MEDICAL OFFICERS OF HEALTH.

By Dr. TRIPE.

SOON after the appointments of the metropolitan medical officers of health by the vestries and district boards, a meeting was called, I believe, at the instance of Mr. (now Sir John) Simon, the medical officer to the City of London. At the first meeting some five or six met in a small dark room—where I cannot remember now, and there are no minutes—when it was decided to form a society under the name of the "Society of Medical Officers of Health." There was no need to use the additional name of "Metropolitan" to distinguish them from others. Mr. Simon was elected president. After certain preliminary meetings had been held it was decided, in the early part of 1857, to organize a plan for collecting and arranging weekly returns of sickness from the various institutions for the treatment of the sick in the metropolis, when Dr. Conway Evans was appointed secretary for this purpose, and Mr. Simon Rood Pittard for the collection of meteorological returns. The first number was printed on April 11th, 1857, and contained returns obtained by the medical officers of health from thirty-two parishes or districts. After a short time returns were sent in by a few other medical practitioners. Some of the large hospitals at first refused the information, but subsequently furnished it. Mr. Pittard was so enthusiastic in carrying out his part of the work that he weekly measured the depth of the water on the weir at Stonebridge Lock, River Lea, often, as he said to me, going in up to his waist. The first sheet published contained 5,151 cases, furnished from 21 workhouses, 27 unions as to the outdoor poor, 9 general hospitals, 22 dispensaries, and other institutions. These were speedily increased, so that the returns embraced frequently from 11,000 to 12,000 cases. The diseases reported were small-pox, chicken-pox, measles, scarlatina, whooping cough, diarrhœa, continued fever, cholera, erysipelas, pyæmia, puerperal fever, carbuncle, inflammatory affections of the lungs, croup, rheumatic fever, ague, and dysentry—a much larger number of diseases than are now obtained under the Infectious Diseases Notification Act. Dr. Conway Evans continued his most laborious work until the publication was stopped by the Local Government Board, because the returns were somewhat irregular, and the cost—£600 per annum—was thought to be too great. The meteorological statistics were furnished by five medical officers of health, and after Mr. Pittard's resignation were edited by Dr. Tripe. Mr. Burge and Dr. Tripe made some observations at Fulham, and Hackney with portions of the same "Ozone Paper," and ascertained in 1857 that the air lost all its ozone in passing over London. This was thought to be a new discovery. I have been particular in thus recapitulating the laborious work done by Dr. Conway Evans on behalf of the society because it was the first attempt to collect statistics of disease for comparison with the statistics of death printed by the Registrar-General. Also to point out the small encouragement afforded by Government in this country for scientific or quasi-scientific and useful work. I would also mention that Dr. Barnes furnished details of the organisms met with in the Thames water, and Dr. Odling's chemical analysis of the same water.

The first president was Mr. Simon, and after his appointment as medical officer to the Local Government Board, Dr. Dundas Thomson, who held office at the time of his death. Then Drs. Druit, Letheby, Buchanan, Thos. Stevenson, Bristowe, Tripe, Dudfield, A. Hill, Corfield, and Armstrong, the last named completing the list. The secretaries have not been so numerous as Dr. Piner acted for many years, the others being Shirley Murphy, Dr. Seaton, and Dr. Sykes, who now fills the position.

Soon after its formation, the society, by the influence of the late Mr. Liddle, obtained permission for the meetings to be held in the rooms of the Scottish Corporation, from which they were transferred to the Society for the Advancement of Social Science, and thence back again to the Scottish Corporation. As the society had never had a home of its own, and the income would not admit of so necessary a means of extending its influence, PUBLIC HEALTH was started as the society's journal, in May, 1888, under the able editorship of Mr. Wynter Blyth. At this time an amalgamation had been effected with the Birmingham and Midland, the North Western, and Yorkshire Associations in the hope of raising the society in the estimation of the public, and especially of increasing its influence.

It would take too long to mention all the interesting and important presidential addresses and the various papers read at the meetings, suffice it to say that they have assisted in advancing sanitary science, and affording useful information to those interested in this most important branch of knowledge.

THE PRESENT POSITION OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

By JOHN F. J. SYKES, M.B., Honorary Secretary to the Society.

The transactions of the Society of Medical Officers of Health appeared annually in a crown octavo volume until the year 1887. Towards the end of that year the last of these volumes was issued. The society then consisted of 22 honorary members, 202 members, and 46 associates. Dr. Alfred Hill at this time was president, and Mr. Shirley F. Murphy and Dr. C. E. Saunders, honorary secretaries. At the suggestion of the President, assisted by the labours of the Secretaries, an amalgamation of the Birmingham and Midland, the North-Western, and the Yorkshire Societies with the central Society was completed, and shortly afterwards, in May, 1888, the monthly journal of the Society, with the title, "Public Health," commenced its career under the able editorship of Mr. Wynter Blyth.

It was in the autumn of 1887 that the Society cooperated with the Sanitary Institute and Parkes Museum in tendering to the International Congress of Hygiene and Demography, then sitting in Vienna, an invitation to hold the next meeting in London in 1891.

At the present moment the Society consists of thirty-seven honorary members, three hundred and seventy-one members, forty-seven associate members, and forty-two associates, a total only three short of five hundred; and twenty-seven candidates await election at the next meeting of the Society.

Quite recently a further branch of the Society was organised in the metropolis. The branches are now four, and consist of the Metropolitan, the Midland, the North-Western, and the Yorkshire.

The journal not only reaches the members, but circulates widely beyond the Society, forming a bond of union amongst workers in public health, an expansion that must ultimately result in the growth of a valuable scientific body devoted to the interests of public health.

The financial success of the journal is placed beyond all doubt, as the handsome balance in the hands of our veteran treasurer will testify, and this in spite of the fact that a heavier drain than in any previous year has been made upon the funds.

It only remains to say that the most prominent workers in public health are upon the Society's roll, which may be truly said to be representative of the sanitary service, a service that possesses a great future.

THE NATIONAL REGISTRATION OF PLUMBERS.—An important meeting will be held to-day at Burlington House, three p.m., presided over, it is expected, by the Right Hon. C. T. Ritchie, M.P., President of the Local Government Board. The meeting will be attended by representatives of local organisations, including the mayors, chairmen of health and sanitary committees, and medical officers of health. The subject for discussion will be "The National Registration of Plumbers in Relation to the Public Health."

THE WATER SUPPLY OF NUNHEAD.—The water supply for Nunhead and district is obtained from Hampton, being pumped thence by the Southwark and Vauxhall Water Company through some fifteen miles of iron main, and stored for distribution in the reservoirs at Nunhead. But the population has increased, and the supply of water has had to be increased, and this has been done under Mr. J. W. Restler, the engineer to the water company, by laying a second main from Hampton to Nunhead. This involved the construction of an iron subway under the Thames just below Kingston Bridge, which subway has recently been completed. It is circular in section, 9 ft. in diameter, and is constructed of cast-iron plates 1 in. thick, and bolted together in segments forming rings 18 in. deep. The method employed in driving the tunnel and fixing the plates was similar to that adopted in the construction of the City and South London Electric Railway. An iron shield of slightly larger diameter than the subway itself was forced forward into the clay by powerful hydraulic jacks for a distance of about 18 in., sufficient to insert one ring of the cast-iron plates. These plates were then fixed and bolted together in position, and the shield again impelled forward as before. By these means the earth in the tunnel was taken out as nearly as possible to the precise dimensions of the iron rings to be inserted. In order, however, to make the work perfectly solid and secure, a grouting of liquid cement was forced in behind and around the rings when finally fixed, thus filling up every possible fissure and crevice between the iron and the surrounding clay. The subway is 600 ft. long under the river, and it has been completed in the short space of nine weeks. The whole length of the tunnel is in the London clay, and at one point the thickness between the top of the subway and the bed of the river is only 2 ft. 6 in. The cast-iron main, of 42 in diameter, which conveys the water from Hampton to Nunhead is divided, in the tunnel, into two pipes of 31 in. diameter each.—*Specialties*, July, 1891.

THE ABUSE OF STEAM IN WEAVING FACTORIES.

IN the last report of H.M. Inspector of Factories is a statement by Mr. Cameron as to the use of steam in weaving sheds in the North of Ireland, as follows:

"In weaving sheds, I regret to say, the use and, although I am aware it is a matter of argument, the abuse of steam continues. I believe that frequently steam is used in excess of any requirement simply through carelessness and lack of observation. Objection is met with the allegation of necesity. The statement constitutes difficulty for an inspector. I am convinced, however, careful supervision would much lessen the evil. In connexion with the subject I call attention to 'Neill's patent improved system for moistening air in weaving factories.' Mr. Neill has introduced this system in the weaving sheds of the Rosebank Weaving Company. I have seen it working in one shed, and steam in another shed. The contrast was marked. The system consists in moistening the air by condensed vapour arising from a cooling reservoir. The air is collected in an enclosure over the reservoir, and from the reservoir it is introduced into the factory by fans or air propellers, and distributed, at a low temperature, through perforated wooden tubes. It is claimed by Mr. Neill that 'compared with steam its advantages are obvious to those who have had experience of both systems. A very great saving is effected by utilising a waste product instead of steam which has to be generated at considerable expense; and practical results show that the atmosphere produced in a weaving factory by the introduction of the vapour is favourable, not only as regards the quality and quantity of the manufacture, but as it also contributes to the health and comfort of the worker.' I wish all success to Mr. Neill's interesting experiment, for I have often felt grave concern at the condition in which I have found weaving factories through the use or the abuse of steam."

INDIA AND THE CONGRESS.—The following gentlemen have been elected vice-presidents of the Congress. H.E. the Viceroy of India, G.M.S.I., G.C.M.S., G.M.I.E.; H.H. the Nizam of Hyderabad, G.C.S.I.; H.H. the Gaekwar of Baroda, G.C.S.I.; H.H. the Maharaja of Jeypore, G.C.S.I.; H.H. the Maharaja of Bhaonagar, G.C.S.I.; H.H. the Maharaja of Cooch Behar, G.C.I.E. One of these princes has sent £200; four have sent £100 each; and the other £50. These sums, liberal as they are, by no means represent all the financial assistance the Congress has received from India. Altogether about £1000 has been sent, and the hon. secretary for India expects a few hundred more. Moreover, altogether about 70 delegates have been appointed by the British Government in India, the Native States, public bodies, (chambers of commerce, universities, municipalities, etc.), and societies. This is not bad work considering that six months ago there was no Indian committee, no Indian delegates, and not a penny subscribed in India. This is the first time that *non-official* India has taken part in any International Congress, and the first time that the Indian princes have subscribed to such an object. The amount of interest felt in the Congress in India is surprising, especially among the natives. The same is the case at Ceylon, the Government of which have sent us one of the most distinguished of Oriental delegates, a Singhalese gentleman, Dr. Solomon Fernando, who will read a paper in the Indian meeting.

CORRESPONDENCE.

THE INFECTIOUS DISEASE (NOTIFICATION) ACT (52 AND 53 VICT., C. 74, S. 3 (b).

WHAT CONSTITUTES "ATTENDING ON" A PATIENT?

TO THE EDITOR OF PUBLIC HEALTH.

SIR,—As this question may be of general interest to your readers, and of special technical interest to medical officers of health, I would ask you to find a place for it in the next number of PUBLIC HEALTH.

On June 23rd, 1891, Dr. McCann, the medical superintendent of the infirmary, Dartmouth Park Hill, N., a poor-law institution containing over 500 beds, wrote to me, calling attention to the case of Mrs. W., of Colva Street, N.W. The following is an extract from the letter: "This person worked in the laundry of this infirmary, and on going home on June 6th, felt ill, and was confined to her bed from June 7th to 12th. She states that she was not feeling well for a week prior to June 6th. On June 7th, she states that a rash appeared, first on hands and then on face, and in the next two days extended over the body. The eruption on the chest she described to me as a faint general redness. On Friday, the 12th, the eruption disappeared, and she got up. She also admitted that she had a sore throat. She resumed work at the infirmary on June 17th, and my attention was directed to her on the 22nd (yesterday). I found her hands desquamating very distinctly, and a roughness of chest, and I fancy she (Mrs. W.) told me her feet were peeling, but I did not examine the latter. I am of opinion that this woman had had scarlet fever, and therefore I sent her home."

Some correspondence in reference to the case took place. I held that the medical superintendent should certify; he, on the other hand, held that he was under no such obligation. The following extract from a letter addressed by me, in reply to one received from the clerk to the guardians explains the position matters assumed: "There appears to me to be a possibility of legitimate difference of opinion in the interpretation of the words of the section, but the results may be serious if the meaning be restricted as suggested, and apply to all public institutions. Consequently the Health Committee has decided to ask the Local Government Board for a definition of the meaning of the words "attending on."

· The two letters which follow herewith explain themselves, but not the words "attending on."—I am, sir, yours faithfully, JOHN F. J. SYKES.

St. Pancras Vestry Hall, N.W.,
July 30th, 1891.

INFECTIOUS DISEASES (NOTIFICATION) ACT, 1889.

Saint Pancras, London, Health Department
Office, Vestry Hall, Pancras Road, N.W.,
17th July, 1891.

SIR,—I am directed by the Health Committee to bring to your notice the following case, and to ask your consideration of the same:—

On or about the 23rd June last, Dr. Sykes, the medical officer of health for the parish of St. Pancras, received a letter from Dr. McCann, stating *that, in his opinion*, a certain Mrs. W————, of Colva Street, Highgate New Town, *had had scarlet fever*, and that in consequence thereof he had sent her home. He mentions that he informed Dr. Adams, also his assistant, Dr. Cooper, of the case, and that the former stated that the case was most likely scarlet, although he did not see the woman. Dr. McCann also states that Dr. Cooper saw the woman with him, and that he is also of his (Dr. McCann's) opinion. It is further stated that the woman informed Dr. McCann that Dr. Haines, of Dartmouth Park Hill, attended her on Monday, 8th June last, and that he stated the woman was suffering from nettlerash, and on being communicated with by Dr. McCann, Dr. Haines replied that he did not remember saying so.

On receipt of the said letter the Medical Officer of Health at once (on 24th June last) caused a printed form to be sent to Dr. McCann, asking him to forward a proper certificate of the case under the above Act (copy of which is sent herewith). To this Dr. McCann replied on the 25th June last that he *suspected* the woman had had scarlet fever, but was by no means certain on the point, and that as she was not under his care as a patient it does not devolve on him to make any notification whatever, and accordingly declined to do so.

The Medical Officer of Health, on 27th June last, replied to such last-mentioned letter, pointing out that in his (Dr. McCann) first letter, of 23rd June, he expressed the opinion that the patient had had scarlet fever, and that his diagnosis was corroborated by others; and that in his second letter, of 25th June last, he declined to certify, not because the patient had not scarlet fever, but because the patient was not under his care.

I enclose a copy of the correspondence, and also a copy of the report made by the inspector, and copy of the certificate of Dr. Haines, dated 27th June, 1891.

I beg to draw your attention to Section 3, Sub-section 1 (b), of the above Act, which provides that:—"Every *medical practitioner attending on or called in to visit the patient* shall forthwith on becoming aware that the patient is suffering from an infectious disease to which this Act applies send to the medical officer of health for the district a certificate stating the name of the patient, the situation of the building, and the infectious disease from which, in the opinion of such medical practitioner, the patient is suffering."

The matter being of great importance, I beg to ask that your board will consider the above facts and decide the point in difference, and give an opinion or interpretation of the words, "*Every medical practitioner attending on or called in to visit the patient*," especially as to what is to be considered as "*attending on*."

It is submitted that if Dr. McCann's interpretation of "attending on" be correct, then every case of infectious disease diagnosed in the out-patient departments of hospitals and sent home without treatment by the physician or surgeon in charge will be exempted from the Act, a state of things which would in that case have a very serious result.—I am, Sir, your obedient servant,

(Signed) WM. MALLISON, Chief Clerk.

Sir Hugh Owen, K.C.B., Secretary,
Local Government Board, Whitehall, S.W.

Local Government Board, Whitehall, S.W.,
27th July, 1891.

SIR,—I am directed by the Local Government Board to acknowledge the receipt of your letter of the 17th instant, enclosing a copy of correspondence which has taken place in reference to the case of a Mrs. Whitlock, who was notified to the Medical Officer of Health of the parish of St. Pancras, as suffering from an infectious disease.

The Board direct me to state that they have no authority to determine the construction which the words, quoted in your letter from Section 3 of the Infectious Disease (Notification) Act, 1889, should bear in the varying circumstances of cases which may arise in connection with that Act. They may, however, state that so far as they are in possession of the facts of the particular case to which your letter relates, these facts do not appear to them to support the view that Dr. McCann was under any such obligation to send a certificate to the Medical Officer of Health as is imposed by Section 3, 1 (b) of the Act.—I am, Sir, your obedient servant,

(Signed) C. A. DALTON, Assistant Secretary.

To W. Mallison, Esq., Chief Clerk, Health
Department of the Parish of St. Pancras,
Pancras Road, N.W.

LEGAL CASES.

COPPER IN TINNED PEAS.

AT Leeds Borough Police Court recently, before Mr. Bruce, the stipendiary magistrate, William Green and Son, grocers, 51, Briggate, appeared in answer to a summons charging them with having sold tinned peas adulterated with 4·7 grains per pound of sulphate of copper. Burgon and Co., provision dealers, 10, Duncan Street, were summoned for having sold tinned peas containing 3·40 grains per pound of sulphate of copper; and against Thomas Yeardley, grocer, 150, Briggate, a similar charge was made, it being alleged that the peas he sold contained 2·7 grains of sulphate of copper per pound. Sir George Morrison, Town Clerk, prosecuted on behalf of the Sanitary Committee of the Leeds Corporation. The case against Messrs. Green and Son, for whom Mr. Foster, solicitor, appeared, was taken first.

The Town Clerk explained that the information was laid under the third section, sub-section A, of the Sale of Food and Drugs Act, 1875, which made it an offence to mix, colour, stain, or powder, or permit any other person to mix them, with any article of food so as to render that article injurious to health. Inspector Walker went to the defendants' shop and bought three tins of peas, stating at the time that they would be analysed. The certificate of Mr. Fairley, the borough analyist, showed the quantity of copper in the tin he examined.

Inspector Walker deposed that he bought the peas on May 26th. The three tins were all of one brand. One of eth assistants in the shop gave him to understand that in consequence of a case which had been heard before his Worship, they wrote to the firm from whom they obtained the peas, and were informed that the peas were "greened" a little, but with nothing injurious.

Dr. Cameron, Medical Officer of Health for the borough, said, in answer to Sir George Morrison, that in his opinion the quantity of sulphate of copper found in the peas would be injurious to health.

By Mr. Foster: The question as to whether or not sulphate of copper was injurious had been a matter of discussion, and there were some experts who declared that a small quantity was not deleterious to health. He did not think 4·5 grains to the pound a large amount, but it was dangerous. He had not heard of a case where harmful results had followed the eating of tinned peas, though he knew they were extensively sold. He was, however, aware of plenty of cases in which copper taken in small quantities had done harm. The quantity of copper found by Mr. Fairley would not produce acute copper poisoning, but it would injure the health. It would not be so difficult to detect the exact quantity of copper in the peas as to make it a matter of much consequence. Sulphate of copper was found occasionally in many articles of food, though in very minute quantities. The use of copper vessels in the preparation of food was a fertile source of poisoning. He should say the copper was used to give the peas an unnatural colour, rather than to preserve their natural colour. The question as to whether the use of sulphate of copper was injurious had been thoroughly gone into by the French Government, the peas coming mainly from France. Until recently the use of sulphate of copper had been prohibited in that country, but the restriction had been removed owing to pressure brought to bear by the manufacturers. He should be much surprised to know that these peas had been extensively sold without any injurious consequences following. The retail dealer could not tell from the appearance of the peas whether or not they had been "greened" by sulphate of copper, because it was possible to have peas of the same colour without the use of this poison.

Re-examined: The poison was cumulative. Five grains of sulphate of copper would kill a dog.

Mr. Thomas Scattergood, Dean of Medicine at the Yorkshire College, stated that in his opinion the peas in question would be injurious to health.

Cross-examined: It would be impossible to say what was the minimum quantity which would be injurious to health. He had not come across patients suffering from poisoning which he attributed to sulphate of copper. It would surprise him to hear that people partook of these peas regularly without suffering any evil consequences. If the peas were taken once they would not necessarily affect a person, but the poison was cumulative.

This concluded the case for the prosecution.

Mr. Foster, in defence, said this was a very important matter for his clients, who occupied a highly respectable position in the town. His instructions were that whatever the peas might have contained, the defendants knew nothing about it. They did all they could to obtain knowledge of the matter, and if he could establish that he thought he should be entitled to ask for the dismissal of the summons under section 5, which provided that no person was liable to be convicted under the 3rd and 4th sections, if he could satisfy the justices that he did not know the article of food was mixed with anything deleterious to health, and had taken reasonable means to obtain such knowledge. The defendants imported the peas from France. They were what were known as the "Globe" brand. Messrs. Green had sold them during the last eight years, and had never heard the slightest suggestion that they contained any deleterious matter until they saw the report of a case which was recently before his Worship. They at once wrote to the people from whom they bought them, and received a reply stating that the peas were subjected to a slight colouring process in order to retain their natural colour, but that the process was recognised, as being uninjurious. Upon getting the summons the defendants again wrote. He (Mr. Foster) contended that the taking of these steps showed Messrs. Green's *bona fides*, and entitled him to ask for the dismissal of the summons under section 5.

Mr. Bruce pointed out that the defendants might have sent a tin of the peas to an analyst.

Mr. Foster thought that if such a course had to be adopted in these cases, it imposed rather an onerous duty on retailers.

Mr. Bruce summed up the case, and said that if it was put to him as a question of law, he did not think that the defendants had taken reasonable steps to find out whether the peas contained any deleterious matter. They wrote to the persons from whom they got the article, asking whether it was a proper article to sell, and that was a course which might suggest itself to tradesmen; but they ought to have made further investigations before proceeding to sell the peas. It was common knowledge that Messrs. Green were a respectable firm. He should convict; but he thought it would be sufficient if he ordered the defendants to pay a nominal fine of 1s. and costs. He wished it to be understood that if others were summoned after this warning they must expect to be fined considerably more than 1s.

Messrs. Burgon and Mr. Yeardley pleaded guilty in the other cases, and similar fines were imposed.

Mr. Bruce remarked that for this state of affairs the public were themselves very largely to blame. As long as people would have green peas out of season, they would find ingenious people ready to supply them.

A similar case was heard lately in Glasgow, before Sheriff Birnie, when James Brown, grocer, 325, New City Road, was charged with having sold a tin containing one pound of preserved green peas, the same being mixed, coloured, or stained with copper or sulphate of copper to ·0045 per cent. or thereby of copper, which was equivalent to 1·26 grains or thereby of sulphate of copper per pound of peas, and so rendered injurious to health.

Mr. Brown pleaded not guilty.

Evidence having been given by the sanitary inspector as to the purchase of the peas, and also as to the report made by the analyst that they contained the quantity of copper charged, Professor Charteris said he regarded copper as a poison. When taken in large doses the symptoms generally were vomiting and diarrhœa, and in small doses weakness and general bad health. He thought it was more dangerous to take small quantities for a long time than a single dose, causing acute poisoning, because when taken for a long time the poison accumulated, and the person taking it was not aware till it was too late.

Dr. Russell, medical officer of the city, gave somewhat similar evidence; and, on being questioned by Mr. Borland as to whether he knew any person who had been injured by taking green peas in the manner described, replied that he knew only the result as regarded himself.

Professor Dalziel, Anderson's College, said that a pound of green peas containing 1·26 grains of sulphate of copper, if taken for a considerable period, would produce chronic poisoning.

The Sheriff found accused guilty, and imposed a penalty of £4.

POLLUTION OF A DITCH.

This was an action (heard before Lord Justice Fry, in the Chancery Division) by Mrs. Ogilvie, of Sizewell House, in the parish of Leiston, Suffolk, against the Blything Union Rural Sanitary Authority, to restrain the pollution of a ditch or sewer which ran through the main street of the town of Leiston past the plaintiff's lands into the sea. The town of Leiston and the plaintiff's lands were both comprised in the district of which the defendants were the sanitary authority. At the date of the action the ditch was covered over as it passed through Leiston, but was an open stream as soon as it left the town, and the water of the stream on its exit from the covered drain was now, and had been for many years, seriously polluted. The plaintiff claimed an injunction to restrain the defendants, as the owners of the covered part of the ditch and as the sanitary authority of the district, from permitting any sewage or other noxious matter to come on to her lands or into her part of the sewer. The facts of the case were shortly as follows: The ditch was originally an open ditch throughout its whole course, but in 1853 it was covered in and converted into a sewer on its passage through the town, and soon afterwards a connexion was made with it from some ironworks belonging to Messrs. Garrett, which caused a serious pollution of the stream. Between this time and 1875 extensive building operations were carried on in the town, and two new streets were constructed called California Road and Prospect Place. In 1875 the defendants were constituted, under the Public Health Act, 1875, the sanitary authority of the district. In 1877 the attention of the defendants was called to the condition of the houses in California Road and Prospect Place, and they required the owners of the houses in those streets to improve their drains. The owners clubbed together, and they ran two 9 in. drains down the two streets and made communications with the main sewer. These drains were made for the purpose of carrying off surface water, and were not connected with any privies or closets, but in addition to the surface water the slops of the houses were allowed to be thrown down the drains. In 1884 the plaintiff's late husband purchased the lands now held by the plaintiff, and in 1885 he made a complaint to the defendants as to the condition of the sewer. In consequence of this complaint a resolution was passed that notices should be served upon the occupiers to divert all polluting matter from the sewer, and the inspector of nuisances was ordered to inspect all drains entering into the main sewer. This resolution was followed up by a vigorous course of procedure on the part of Mr. Mountain, the inspector, who served altogether 103 notices. These notices were all effective in causing an abatement of the nuisance except four, and in those four cases the defendant authority took out summonses against the offenders, but the summonses were ultimately dismissed at the instance of the defendants in consequence of proceedings which were being taken in Parliament for an improved system of drainage in the district, which proceedings were still pending. In August, 1889, a complaint was made on the subject of the pollution of the sewer by the plaintiff, and she threatened to enforce her rights to the utmost if she found any impurity in the water passing through her lands. Upon this the surveyor of Leiston was directed to cleanse the main drain, and the inspector was directed to see that only surface water passed through the drain, and to serve notices for the abatement of nuisances. These directions were duly carried out, and the effect of these proceedings was to diminish the pollution of the ditch to some extent. The defendants pleaded that they had done everything in their power to prevent any nuisance from being occasioned to the plaintiff or her property, that there had been no recent increase in the discharge of sewage matter into the drain, and that they were not responsible for the nuisance.

Mr. Murphy, Q.C., Mr. Neville, Q.C., and Mr. Archibald Brown were for the plaintiff; Mr. Chadwyck Healey, Q.C., and Mr. Ingle Joyce for the defendants.

Lord Justice Fry, after stating the facts and observing that there was a broad distinction between an injunction to restrain the doing of an act and an injunction to restrain the permitting of an act to be done, said that in his judgment the defendants had been diligent in the matter, and had done all they could to abate the nuisance. It was not shown that there were any communications with the main drain which they had the means of cutting off. In the interval between 1853 and the present time it was almost inevitable that some prescriptive rights of drainage should have been acquired. The defendants had no authority to interfere with prescriptive rights, nor could they stop the permission as to throwing slops down the drains which had been granted to induce the occupiers to spend money in the improvement of their drains. Were there any other communications with the main drain which the defendants could cut off but had not cut off! His Lordship was not satisfied that there were. The circumstances of the case were, therefore, favourable to the defendants. An argument had been addressed to the Court upon several sections of the Public Health Act, 1875, but that Act did not appear to throw much light upon the question. Section 13 provided for the vesting of sewers in the local authority, and it was said that that section placed the local authority in the same position as regards such sewers as if they were private owners, but his Lordship could not accede to that contention. Section 17 declared that nothing in the Act was to authorise the local authority to make or use any sewer for the conveyance of sewage into any natural stream until such sewage was freed from noxious matter, but that section referred to the making and using of a sewer by the local authority, and not to permitting the user of an existing sewer, and the same observations applied to Section 332, which was also relied on. There were a series of authorities which were strongly in the defendants' favour. The first was "Glossop v. Heston Local Board" (12, Ch.D., 102). In that case, no doubt, language was used by the Court which tended to show that if the sewer had been vested in the local authority they would have been in the same position as a private owner, but the point was only referred to collaterally, and in "Attorney-General v. Dorking Local Board" (20, Ch. D., 595), which was much nearer this case, the sewer was vested in the defendants. In that case, notwithstanding that there was proof of a gradually increasing nuisance, the Court declined to grant an injunction, because the Court came to the conclusion that the board had no right physically to cut off the drains so as to abate the nuisance. If any distinction could be drawn between that case and the present it was a distinction favourable to the defendants, for here there was no proof of any recent increase in the nuisance. "Charles v. Finchley Local Board" (23, Ch. D., 767), which had been relied upon by the plaintiff, was a different case, because there the Board had power to stop the nuisance without causing any special inconvenience to the neighbouring inhabitants. The action must be dismissed, with costs.

PROSECUTION UNDER THE NOTIFICATION ACT AT TRURO.

At the Truro City Police Court, on August 4th, Harry Peters, of Chapel Hill, was summoned for not giving notice to the medical officer of health of having an inmate in his house suffering from an infectious disease, viz., scarlet fever, in the month of June last, contrary to the Infectious Diseases Notification Act, 1889. Mr. R. M. Paul, Town Clerk, appeared to prosecute, and Mr. Laurence Carlyon defended.

Mr. Paul stated that he prosecuted in this case on behalf of the Council, and the prosecution was brought, not for the purpose of procuring a heavy penalty, but in order that the law might be made known.

Mr. E. Sharp, medical officer of health for the city, said in the month of June he received information that two children of the defendant's were suffering from scarlet fever, and, as medical officer of health, he went to the house. The mother told him that the child in the cradle was suffering from scarlet fever. Mr. Carlyon objected, observing that this was not evidence. Unless, he said, a parent was aware that a child was suffering from a contagious disease, he was not bound to report the case.

Mr. Sharp said that was so.

Mr. Carlyon: Then how can an occupier report a case when he is ignorant of it?

In answer to further questions, Mr. Sharp said he went to the house on information received. He did not know anything about the past history of the case. He did not examine the tongue of the child, but he noticed there was desquamation. The case was reported to him as scarlet fever, and as medical officer, he was bound to take the information. He visited the house as medical officer of health.

Mr. Carlyon: You cannot tell of your own knowledge whether the child was suffering from scarlet fever or not?

Mr. Sharp: I can tell on the evidence of the mother of the child, who said that he had scarlet fever, and I saw desquamation, which followed scarlet fever.

In reply to further questions, Mr. Sharp said desquamation followed roseola and also erysipelas. Roseola was an infectious disease, but of too trivial a nature to be mentioned in the Act.

Mr. Carlyon: Did you give the woman instructions to isolate the case, and to disinfect the house?—I gave them the instructions to take the child away from school, and to keep them both isolated.

Mr. Carlyon: Did you give them any instructions to disinfect the house?

Mr. Sharp: No, I don't think I did.

Mr. Carlyon: For three months might there not be infection in the house?—For a long time, probably.

Did you tell Mr. Clemens, the sanitary inspector, to go and see that this house was thoroughly disinfected after this dangerous case of scarlet fever?—I cannot remember that I did.

Do you mean to say that, as medical officer of health of this city, you did not tell that woman to thoroughly disinfect that house, being of opinion that the child had scarlet fever, which is a very dangerous and infectious disease? The children had been so long ill, and whatever damage accrued had been done already, and I did not take any further steps.

In answer to further questions Mr. Sharp said he reported to the Urban Sanitary Authority about the case.

Roderick Marshall, assistant to Mr. Sharp, said he visited defendant's house on July 11th, and saw the child in question. He found it peeling freely and suffering from enlarged glands, and he received a history of the rash, and came to the conclusion that it was a case of scarlet fever. He believed he examined the child's tongue, but could not be positive on the point.

Mr. Carlyon: Did you take the temperature of the child?—Mr. Marshall: Not then.

Had you ever taken it?—No.

Is not the temperature one of the most important things?—You are talking of the early stages of the fever; I am talking of the later stages.

Mr. Carlyon: We will talk about both, sir. Why did you not take the temperature of the child?

Mr. Marshall: Because it would not be of much value to me.

Witness, in further reply, said peeling of the skin might follow roseola and other ailments, and Mr. Carlyon, commenting on this fact, said in his opinion the case ought to end here. The Act stipulated that the occupier of the house must be aware of the existence of the disease, and there was no evidence in this case to show that the defendant knew his child had been suffering from scarlatina.

Mr. Marshall said he had no doubt the child was suffering from scarlatina, and he believed he told the parents so.

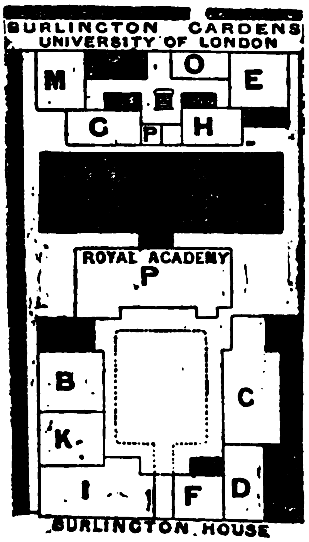
Mr. Carlyon, in addressing the Bench, said he was quite aware that ignorance of the law was no excuse, but his client never saw the Act under which this charge was brought. He also emphasised the fact that neither Mr. Sharp nor Mr. Marshall could swear that the people were aware that the children were suffering from scarlatina.

The Mayor, on return of the magistrates, said the Bench had given the matter their careful consideration, and had come to the conclusion that the charge had been proved—that there was scarlet fever in the house. As, however, this was the first case, Peters would be fined only 5s., and costs.

Mr. Carlyon gave notice of appeal.

The Sewerage of Grays, Essex.—Two alternate schemes of sewage disposal have been suggested, and formed the subject recently of a Local Government Board enquiry. The first was for delivering all the sewage to one point by gravitation, and then pumping it a lift of 97 feet to Lodge Farm, where it was proposed to purify it by irrigation on 93 acres of land. This scheme is opposed by the South Essex Water Company, and by local authorities who use the company's water, on the ground that the supply would be polluted by the effluent getting through the chalk strata into the company's well, about a mile from the farm. The Local Board's engineer contends that as the large fissures in the chalk invariably ran from north-west to south-east, and the farm was to the north-east of the company's well, none of the effluent would get into the supply. The sewage is at present poured into the chalk through various dumb-wells in a line with the chalk fissures, and it is very desirable to discontinue that system. The scheme is also opposed by a neighbouring brewery firm. Under the second scheme, the sewage will have to be lifted into tanks and treated with chemicals, and the effluent will then be discharged into the river at the ebb tide by gravitation, the loan required being only £26,000. The population of the town is 12,000, but it is proposed to provide for 30,000. It is proposed to have separate systems of sewers for sewage and surface water. The second scheme is not opposed to the same extent as the first.

PUBLIC HEALTH,
THE OFFICIAL ORGAN of the CONGRESS of HYGIENE and DEMOGRAPHY, 1891,
AND
The Journal of the Society of Medical Officers of Health.



REFERENCES.

A. Opening Meeting. St. James' Hall.
B. Section 1. Preventive Medicine.—Antiquaries Society, Burlington House.
C. Section 2. Bacteriology.—Royal Society, Burlington House.
D. Section 3. Diseases of Animals.—Geological Society, Burlington House.
E. Section 4. Infancy and Childhood.—Theatre of the London University.
F. Section 5. Chemistry and Physics.—Chemical Society, Burlington House.
G. Section 6. Architecture.—West Examination Room, London University.
H. Section 7. Engineering.—East Examination Room, London University.
I. Section 8. Naval and Military.—Linnæan Society, Burlington House.
K. Section 9. State Hygiene.—Astronomical Society, Burlington House.
L. Section 10. Demography.—Museum of Geology.
M. Reception Room. Library, London University.
N. Ladies' Reception Room. Agnew's Gallery, Bond St.
O. Committee Room.
P. Press Room. Royal Academy of Arts.
" " London University.
" " Museum of Geology.
Q. Gibson and Diploma Galleries, Royal Academy of Arts.

PUBLIC HEALTH.—All communications and letters for PUBLIC HEALTH should be addressed to Professor Wynter Blyth, offices of PUBLIC HEALTH, Burlington House.

PRESS CUTTINGS.—A CAUTION.—It is probable that many members of the Congress have received offers from press cutting agencies offering to send reports of their speeches, and the references to them which appear in the newspapers. We wish to caution all members not to pay any money in advance to any agency without making due inquiry.

THE SEVENTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

THE work of the Congress began in earnest yesterday. The meetings took place simultaneously in ten different rooms, which were all crowded with appreciative audiences.

DIVISION I.—HYGIENE.

SECTION I.—PREVENTIVE MEDICINE.

THIS Section was opened by the PRESIDENT (Sir Joseph Fayrer, K.C.S I.), at ten a.m. this morning, when he delivered the following address:—

My first duty on occupying this seat is to make fitting acknowledgment of the honour which has been conferred on me, and to assure those to whom I am indebted for it that, as I appreciate the distinction highly, so, with the aid of my colleagues in this section and the support of the many eminent men of science who will take part in its work, I hope to discharge faithfully the important trust reposed in me.

My next and most agreeable duty is to offer to all who honour us with their presence, or who propose by co-operation to forward the objects of the Congress, a most hearty welcome and cordial recognition of the interest in it manifested by their presence; to express a hope that the deliberations and conclusions which result from their wisdom and experience may advance our knowledge, and tend to enhance the welfare of the human race.

This hope is based upon the universal recognition of the need of and capacity for improvement in the conditions upon which physical well-being, immunity from disease, and prolongation of life depend; and this is evinced by the assembling together in this Congress of men of science from all parts of the world, who have devoted themselves to the great international, humanitarian purpose of ameliorating the conditions of mankind everywhere, so far at least as the application of the laws of health, and, to some extent, those of sociology, can effect this consummation.

To all, then, we in this great City, who are interested in the progress of hygiene and demography, offer our cordial greeting, and express an earnest desire that our visitors may derive pleasure and benefit from their sojourn in London, and from the proceedings of the great assembly of which they form so important a part.

Before I invite Dr. Cunningham to open the first subject for discussion, it is right that I should make a few preliminary remarks on the general scope and objects of the work comprised in this section. I do not intend to occupy much of the short and valuable time at our disposal by discussing any special subject, or by anticipating that which those who follow me may have to say, but shall confine myself to a brief notice of the present aspects of Preventive Medicine, its recent development, how much it has operated and is now operating for the public good, how slowly but surely it is dispelling the cloud of ignorance and prejudice which has overshadowed and impeded the progress of sanitation, and how it is gradually imbuing the public mind with the conviction that prevention is better and often easier than cure, that health may be preserved, disease avoided, and life prolonged by the study and observance of certain well-known laws, which, correlating the individual with his surroundings, determine his well-being when conformed to, deteriorate or prevent it when neglected, and should enforce the maxim "venienti occurrite morbo."

Unprecedented progress in human knowledge characterizes the present century, and has not been wanting in preventive medicine; it is, however, during the last half of it that advance has been most remarkable, whilst it is in a later part of that period that it has so established itself in the popular mind as to have passed from the region of doubt and speculation into that of certainty.

It is now pretty generally understood that about one-fourth of all the mortality in England is caused by preventable disease, that the death-rate of large communities may be reduced much below that at which it has been wont to stand, the average duration of life may be made to approximate nearer to the allotted four score, and that the conditions of living may be greatly ameliorated. The chief obstacles to improvement have been ignorance and want of belief; a better knowledge of the laws of life and health, a more rational comprehension of the nature and causes of disease, are gradually but surely entailing improvement in the conditions of living and in the value of life, and the diminution and mitigation, if not extinction, of morbid conditions which have in past times proved so injurious or destructive to life. In short, as Dante says:—

> "Se' l mondo laggiù ponesse mente
> Al fondamento che natura pone,
> Seguendo lui avria buona la gente."
> Paradiso, viii., 142.

Such are the subjects contemplated in the work of this section, and, as far as time permits, the most interesting of them will be discussed. Those selected are of great importance in their relations to public health; let us hope that observers who have formed their opinions from experience in other countries and under different circumstances may throw new light on them.

In the brief space of time at my disposal, it would be impossible to give a continuous outline of the progress of Preventive Medicine during the past, or to trace its growth and development out of ignorance and superstition to its present well established foundation on a scientific basis. It is of happy augury for mankind that the subject of public health is now fairly grasped by popular sentiment, and that, though ignorance, opposition, and vested interests still contest the ground, progress is sure, and the light of science is illuminating the dark places. It is now better appreciated than it ever has been, that the causes which induce disease and shorten life are greatly under our own control, and that we have it in our power to restrain and diminish them, and to remove that which has been called "the self-imposed curse of dying before the prime of life."

It is indeed only recently that the resources of medical science have been specially devoted to the prevention as distinguished from the cure of disease, and how far successfully, I hope in a few words to show, whilst I trust the proceedings of the various sections of this Congress will indicate how much remains to be done.

Did time permit, I might illustrate the progress of Preventive Medicine by contrasting the state of England with its population of more than 29,000,000 during the Victorian, with the England of the Elizabethan age with its 4,000,000. I might remind you of the frightful epidemics which had devastated the land in the forms of black death, sweating sickness, plague, petechial typhus, eruptive fevers, small-pox, influenza, and other diseases, such as leprosy, scurvy, malarial fever, dysentery, &c., of the wretched mode of living, bad and insufficient food, filthy dwellings, and ill-built towns and villages, with a country uncultivated and covered with marshes and stagnant water [according to Defoe one-fifteenth part of England consisted of standing lakes, stagnant water, and moist places, the land unreclaimed, and with the chill damp of marsh fever pervading all]. The homes of the people were wooden or mud houses, small and dirty, without drainage or ventilation, the floors of earth covered with straw or rushes, which remained saturated with filth and emitting noxious miasmata. The streets were narrow and unpaved, and no drains but stagnant gutters and open cesspools, while the food was principally salted meat with little or no vegetable. To this may be added a large amount of intemperance and debauchery. As it is, I can only just allude to them.

In such conditions disease found a congenial nidus, and by a process of evolution assumed the various epidemic forms which proved so destructive to life. Some of these have gone, let us hope never to return, and the conditions which fostered, if they did not cause them, have gone also. Can we venture to hope that it will be the same with those that remain? Our immunity during the last diffusion of cholera gives some ground for thinking it may be so, if, indeed, the legislature and popular intelligence should be of accord on the subject.

If we turn to the present, we find that great improvements have gradually been made in the mode of living; the houses are better constructed, the drainage and ventilation are more complete, the land is better cultivated, and the subsoil better drained; marsh fever and dysentery, at one period so rife, are unknown, and leprosy has long since disappeared. The death-rate is considerably reduced, and the expectancy of life enhanced. Water is purer, food is more varied and nutritious, clothing is better adapted to the climate, the noxious character of many occupations has been mitigated, and the mental, moral, and physical aspects of the people altogether improved; education is general, a better form of government prevails, and the social conditions are far in advance of what they have been; but still the state of our cities shows that improvement is demanded, and one object of this Congress is to point out why and how this may be affected, not only in this country, but throughout the world.

If we inquire into the effects of certain well-known diseases, we find that they are less severe in their incidence, if not less frequent in their recurrence.

With regard to small-pox, since the passing of the first Vaccination Act in 1840, the death-rate has diminished from 57·2 to 6·5 per 100,000 for 1880-4, though for the five years 1870-74, it was 42·7, thus showing that there was still much to be learnt about vaccination.

Enteric fever was not separated from typhus before 1869, but since then the death-rate has decreased from 0·39 to 0·17 per 1,000, and it has been shown that this improvement was synchronous in different parts of England with the construction of proper drains.

The diminution in the death-rate from typhus is quite as striking, and this also is shown to have run parallel with improved sanitation in more than one large town.

The death-rate from scarlatina fluctuated between 97 and 72 per 100,000 between the years 1851 and 1880, and though it has diminished considerably of late years (17 per 100,000 in 1886), a corresponding increase in the death-rate from diphtheria has taken place; this may be due in part to a better differentiation of the two diseases.

In 1858 it was reported that phthisis killed annually more than 50,000 people; the death-rate from this disease has not decreased very much for England and Wales, but it has done so in some large towns, notably in Liverpool, and Dr. Buchanan, and Dr. Bowditch of Massachusetts, both showed a striking parallelism between the diminution of the death-rate from this cause and the drying of the soil resulting from the construction of sewerage works.

Cholera first appeared in England in 1831, and there were epidemics of it in 1848-49, 1853-54, and 1865-66, but the number of deaths diminished each time it appeared, and though it has been present since, it has never reached the height of an epidemic. This is fairly attributable to local sanitary rather than to coercive measures.

Preventable disease still kills yearly about 125,000, and considering the large number of cases for every death, it has been calculated that 78½ millions of days of labour are lost annually, which means £7,750,000 per annum; this does not include the days lost by the exhaustion so often induced by the still too numerous unhealthy houses of the poor.

Towns, villages, and houses are still built in an insanitary way; the death-rate is still higher, and the expectancy of life lower than it should be, and though we have got rid of the terrible plagues of the middle ages, yet in this century, now closing, other epidemics have made their appearance; cholera has four times visited us; fevers, eruptive diseases, and diphtheria have prevailed; influenza has appeared several times, even recently, and after leaving us last year only to return with renewed virulence, caused in the United States a mortality almost equal to that of the Plague.

Much has been done, and a great deal of it in what is called the pre-sanitary age, but much remains to be effected; let us hope that the future may be more prolific of improvement than the past; international philanthropy seems to say it shall be so.

That we can exterminate zymotic disease altogether is not to be expected, but there cannot be a doubt that we may diminish its incidence, and though we may never be able to reach the "fons et origo mali," yet we can make the soil upon which its seed is sown so inhospitable as to render it sterile.

The scope and objects of Preventive Medicine are not limited to the removing of conditions which give rise to zymotic disease, nor even of those which compromise otherwise the physical welfare of mankind, but should extend as well to a consideration of the best means of controlling or obviating those which, attending the strain and struggle for existence, involve over-competition in various occupations, whether political, professional, or mercantile, by which wealth or fame is acquired or even a bare livelihood is obtained, and under the pressure of which so many succumb, if not from complete mental alienation, from breakdown and exhaustion of the nervous system, which give rise to many forms of neurotic disease and add largely to the numbers of those laid aside and rendered unfitted to take their due share in the natural and inevitable struggle for existence.

Or I might point to the recrudescence of those psychical phenomena manifested by the so-called hypnotism or Braidism—morbid conditions arising out of the influence of one mind upon another; this is a subject which demands not only further investigation, but great precaution as to its application, and claims the watchful notice of preventive medicine on account of the dangerous consequences which may ensue from it.

Again, the abuse of alcohol, opium, chloral, and other stimulants and narcotics, and the evil consequences which may result therefrom, is also a subject worthy of consideration, and will no doubt receive it in a communication which is to be brought before this section.

The possible deleterious influence of mistaken notions of education as evinced in the over-pressure which is exercised upon the young, the predominance of examinations, their increasing multiplication and severity, and the encouragement of the idea that they are the best test of knowledge, whilst true mental culture is in danger of being neglected and physical training, if not ignored, left so much to individual inclination,—this is another subject which demands the jealous scrutiny of Preventive Medicine, whose duty it is to safeguard the human race from all avoidable causes of either physical or mental disease.

Though preventive medicine in some form has been practised since the days of Moses, yet it has received but little recognition until a comparatively recent period; when science developed and observation extended, medical men and others became impressed with the influence of certain conditions in producing disease, and thus it was forced upon the public conscience that something must be done; and when philanthropists like John Howard devoted life and property to the amelioration of such awful conditions as existed, *e.g.*, in our jails, where the prisoners not only died of putrid fever, but actually infected the judges before whom they came reeking with the contagion of the prisons, rude sanitary measures gradually came into operation, and partially obviated these evil conditions, but it was not before the middle of this century that any scientific progress was made; it was when Chadwick, Parkes, and others initiated the work by which they have earned the lasting gratitude of the human race, that Preventive Medicine became a distinct branch of medical science.

The sanitary conditions of towns and communities is not dependent on the views or exertions of individuals alone, for they are and have been for the last fifty years largely cared for by the legislature, and a variety of Acts have been passed which deal with questions concerning the public health; indeed, were all the provisions enforced, little would remain to be desired on the part of the executive Government, but as many of them are permissive, not compulsory, the benefit is less complete than it might be. The old difficulty of prejudice combined with ignorance still too often stands in the way, and despite evidence which on any other subject would be conclusive, the most obvious sanitary requirements are often ignored or neglected. Many thousands of lives have been saved by the Sanitary Acts now in force; but there is little doubt that more thorough organisation under State control, as under a Minister of Public Health, would have most beneficial results, and would save a great many more.

We must acknowledge, however, that we are much indebted to the action of the Government Local Board, under whose able administration the most crying evils are gradually being rectified. Through the wise precautions enacted by it against the importation and diffusion of epidemic disease, when other parts of Europe were affected by cholera this country escaped, or so nearly so as to suggest that it was to sanitary measures we owed our immunity.

That there is something in the nature of epidemics which brings them under the dominion of a common law as to their extension seems certain; that there is much about them we do not yet grasp is equally true, but it is as surely the case that local sanitation is the preventive remedy, as it is that coercive measures to arrest their progress are unavailing.

Under the improved system of sanitary administration, which now obtains and is gradually developing to a greater state of perfection, the sanitary administration of every district in the country is entrusted to the care of duly-qualified health officers—a system from which excellent results have already accrued, and from which better still may be anticipated.

The records of the past fifty years prove the influence exerted by sanitary measures on vital statistics.

The first reliable tables from which the expectancy of life may be derived show that in 1838 to 1854 it was for males 39·91, for females 41·85 years; by the tables of 1871 to 1880 it had increased to 41·35 for males, and 44·66 for females. It is shown also that the expectation of life increases every year up to the fourth year, and decreases after that age. For males up to 19 years it is higher by the last tables, but after that age it is higher by the old table; for females it is greater by the new table up to 45, but after that age it is less.

The improved sanitation saves more children's lives, but the conditions of gaining a living are harder than they were at the time of the first table, which accounts for the expectancy of life for adult men being less. Women remain more at home where the better sanitation tells, and are not subject to quite the same conditions as men, so that their expectancy of life is greater than by the old tables up to the age of 45.

A further proof of the effects of sanitary work is a decreased death-rate. Let us compare the death-rates of England during past times with the present; whether they be equally significant for other countries, I cannot say, but these at all events sufficiently prove the point in question.

DEATH-RATE.

1660-79	80	per 1,000.
1681-90	42·1	,,
1746-55	35·5	,,
1846-55	24·9	,,
1866-70	22·4	,,
1870-75	20·9	,,
1875-80	20·0	,,
1880-85	19·3	,,
1885-88	18·7	,,
1889	17·85	,,

In some parts of England, where the main object is the recovery or maintenance of health, the death-rate is down to 9 per 1,000, while in others, where the main object is manufacture and money-making, it is as high as 30 per 1,000.

Nowhere, I think, have the beneficial results of sanitary work been better illustrated than in India during the past thirty years. A Royal Commission was appointed after the Crimean war to inquire into the sanitary condition of the Britith army, and this in 1859 was extended to India. The European army was the special subject of it, but the Native troops were referred to incidentally. Here the inquiry had to deal with a large body of men, concerning whom, their conditions of existence being well known, reliable information was accessible. It was ascertained that up to that time the annual death-rate over a long period had stood at 69 per 1,000. The inquiry resulted in certain changes and improvements in the housing, clothing, food, and occupation of the soldier. Since these have been carried out, there has been a steady decline in the death-rate, and the annual reports of the Sanitary Commissioners to the Government of India give the rates as:—

1886	15 18	per 1,000.
1887	14·20	,,
1888	14·84	,,

During some years it has been even lower, down to 10 per 1,000, whilst the general efficiency of the troops has increased. It is not easy to estimate the money equivalent of this, but if we take the rough standard which values each soldier at £100, a simple calculation will show how great is the gain, and who can estimate the value of lives saved and suffering avoided?

As to native soldiers with whom the European troops may be compared, I find that the death-rate was—

in 1886	13·27	per 1,000
in 1887	11·68	,,
in 1888	12·84	,,

Famine, cholera, and other epidemic visitations in some years disturb the regularity of the death-rate; under less favourable conditions of living, as in the case of prisoners in the jails, it is somewhat higher.

In the Indian jails, for example, it was—

in 1886	31·85
in 1887	34·15
in 1888	35·57

On the whole, all this indicates improvement,[*] and as regards the civil population progress also is being made; but here, from so many disturbing causes, the figures are neither so easily obtained nor so reliable. The comparatively large mortality is due to neglect of the common sanitary laws added to extremes of climate, which favour the incidence and diffusion of epidemic disease, and intensify it when it has once appeared.

A Sanitary Department has existed in India since 1866, and every effort is made by Government, at no small cost, to give effect to sanitary laws; there can be little doubt that the results, so far, are good, that disease generally is diminishing, and that life is of longer duration.

An important result of the observations of the able medical officers of the Sanitary Service of India has been to show that cholera is to be prevented or diminished by sanitary proceedings alone, and that all coercive measures of quarantine or forcible isolation are futile and hurtful. Here I may say that large as may appear the death-rate from cholera in India (*i.e.*, in 1888, 1·99 per 1,000 for the European army and 1·35 for the civil population), it is small compared with that of fevers, which caused, in 1888, 4·48 per 1,000 in the European army and 17·09 in the civil population; but there is every reason to believe that these also are becoming less fatal under the influence of sanitary measures.

In preventive as in curative medicine, knowledge of causation is essential. It is obvious that any rational system of proceeding must have this for its basis. A certain empirical knowledge may be useful as a guide, but no real advance can be expected without the exactitude which results from careful scientific observation and induction; the spirit of experimental research, however, is now dominant, and progress is inevitable. How much we owe to it is already well known, whilst, under its guidance, the reproach of uncertainty which attaches to medicine as a science is disappearing. Recent advances in physiology, chemistry, histology, and pharmacology have done much to throw light on the nature and causes of, and also on the means of preventing or of dealing with disease.

It is impossible to exaggerate the value of the scientific researches which have led to the antiseptic methods of preventing the morbific action of micro-organic life, whether the toxic effects produced by them, or those induced autogenetically in the individual. Theory has here been closely followed by its practical application in prevention and treatment of disease, whilst the study of bacteriology, which is of such remarkable pre-eminence at the present time, is opening out sources from which may flow results of incalculable importance in their bearing on life and health. That the conclusions arrived at are always to be depended on I doubt, and it seems that scientific zeal may perhaps sometimes outrun discretion. Is it too much to recall the caution uttered by Dante, to beware of

> " Immagini di ben seguendo false
> Che nulla promission rendono intera."
>
> Purgatorio, xxx., 131.

That it might be wiser to postpone generalisation has, I think, been more than once apparent, whilst the expediency of further investigation before arriving at conclusions which may subsequently prove to be erroneous, should not be lost sight of; but it has probably ever been so in the course of scientific progress, that in the enthusiasm of research, which is rewarded by such brilliant results, early generalisation has too often been followed by disappointment, and it may be by temporary discouragement of hopes which seemed so promising.

It would be well to bear in mind a caution recently given by the Duke of Argyll, "that we should be awake to the retarding effect of a superstitious dependence on the authority of great men, and to the constant liability of even the greatest observers to found fallacious generalisations on a few selected facts."[*] Still it is in the region of scientific research by experiment that we look for real progress, and we can only deplore the mistaken sentiment, the false estimate, and the misconstruction of its aspirations and purposes, which have placed an embargo on experiment on living animals, rendering the pursuit of knowledge in this direction well-nigh impossible if not criminal; whilst for any other purpose, whether of food, clothing, ornament, or sport, a thousandfold the pain may be inflicted without question. The inconsistency of the sentiment which finds unwarrantable suffering in an operation performed on a rabbit, when the object is to preserve human or animal life or prevent suffering, but which raises no objection to the same animal being slowly tortured to death in a trap, or hunted or worried by a dog, needs no comment; whilst the spirit which withholds from the man of science what it readily concedes to the hunter, is, to say the least, as much to be regretted as it is to be deprecated.

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[*] "It is to be noticed with regret that during the last five years there has been a tendency to revert to a higher death rate and percentage of sickness. Let us hope this will prove only transitory; the attention of sanitary authorities both at home and in India, is anxiously directed towards the removal of whatever may be the cause of it.

"It is shown both by the vital statistics and the history of the chief diseases, that there is in India an enormous amount of preventable sickness and death," but "that the local insanitary conditions or local disease causes are well-known and widespread."
, S. C.'s Reports for 1889,

[*] "Nineteenth Century," April, 1891.

It must be remembered that, important as are the researches into microbiology, there are other factors to reckon with before we can hope to gain a knowledge of the ultimate causation of disease. It is not by any one path, however closely or carefully it may be followed, that we shall arrive at a full comprehension of all that is concerned in its etiology and prevention, for there are many conditions, dynamical and material, around and within us which have to be considered in their mutual relations and bearings before we can hope to do so; still, I believe we may feel satisfied that the causes of disease are now being more thoroughly sought out than they ever have been—all honour to those who are prosecuting the research so vigorously—and that though individual predilection may seem sometimes to dwell too exclusively on specific objects, yet the tendency is to investigate everything that bears upon the subject, and to emphasise all that is implied in the aphorism, "salus populi, suprema lex."

The **President** then called upon Surgeon-General J. M. **Cunningham**, C.S.I., M.D., to read his paper,

"The Mode of Preventing the Spread of Epidemic Disease from One Country to Another."

Surgeon-General **Cunningham** commenced by stating that he intended to avoid all theoretical questions, either of nomenclature or causation, and to deal only with the practical side of the subject. He intended to mention the methods now in practice, and to point out how much good they had done. Taking cholera as the type of epidemic disease, we have three well-recognised methods of preventing its spread from country to country, viz.: (1) Quarantine, (2) medical inspection, (3) sanitary improvement. The first method is of two kinds, land-quarantine and sea-quarantine. Surgeon-General Cunningham dismissed both sorts of quarantine as useless, and founded upon theories not borne out by events. Land-quarantine he said to be impracticable, and sea-quarantine to have done no good. He pointed out the liability of the inhabitants of Malta to all epidemics as a good example of the failure of sea-quarantine to effect practical results. To the second method, that of medical inspection of those entering a port, he allowed some merit. Certainly the sick benefited by it, but it could have no influence towards the prevention of the introduction of such an epidemic as cholera. The third method, that of sanitary improvement, must be the only one of real service. The fact that quarantine ignores the march of sanitary science is one of the chief arguments against its utility.

After this paper, Sir Joseph Fayrer left the chair, proposing in his place M. A. Professor Brouardel, of Paris, who called upon M. Proust for his paper. In the absence, however, of this gentleman through illness, and of any volunteer to read his paper, Inspector-General Lawson was called upon to address the meeting.

Inspector-General **Lawson** read a paper on

The Transmission of Cholera from one Country to Another.

To draw up a plan to prevent the extension of disease, say cholera, from one country to another, with any prospect of success, it is necessary that we should have a general acquaintance at least with the different factors which contribute to this result, and of their mode of operation. The information on these points, among the members of the medical profession, is at present very far short of these requirements, and its increase has been enormously impeded by the mass of the profession having adopted the belief that man himself was the chief agent in diffusing this disease, by their formulating on this assumption modes of operation which they deem it should follow in its development, and their interpreting the evidence, derived from various sources, with a strong bias in favour of the theory.

There has been, in short, and still remains, a most serious error in assuming that personal communication was so powerful a factor as many believed, and a no less extensive error in the methods and reasoning by which the central idea of diffusion by man was advocated.

It is generally recognised that cholera presents itself in two distinct forms, viz., that of simple or summer cholera, or cholera nostras, in which, with cramps and vomiting, and diarrhœa, the evacuations remain bilious; there is but rarely collapse, and the mortality is but small; and that in which the evacuations become like rice water, the urine is suppressed, collapse often profound, and the mortality always great. This is usually called Asiatic, or Indian, or epidemic cholera, but which, as avoiding any hypothesis, had better be denominated malignant cholera.

Among the instances which have occurred of late years of the outbreak of malignant cholera at points in advance of those the disease had already reached in the epidemic form, three may be particularised, as having been carefully examined into by most able investigators, viz., those at Southampton in 1856 by Dr. Parkes, and at Theydon Bois, in Essex, the same year, by Mr. Redcliffe; that at New Orleans in 1873, by the Board of Health there; and that at Toulon and Marseilles in 1884, by M. Fauvel, Drs. Brouardel and Proust, and others from Paris and at Toulon. In none of these was there any trace of communication by sick or fomites detected.

So far the occurrences which precede an epidemic of cholera in full force, and which the late Dr. Bryden proposed to name the aura of the epidemic. In this instance the epidemic soon followed, for in 1866 England, the east coast of Scotland, northern France, Belgium, Holland, and all the country up to the shore of the Baltic came under it during the summer.

Its influence was also experienced half-way across the Atlantic early in the year, as the facts show distinctly, especially in regard to the steamship "England," which sailed from Liverpool on March 28th, with 37 cabin and 1,059 steerage passengers, Germans from East Friesland. Cholera appeared among the latter April 3rd. She put into Halifax on the 9th, having had 150 attacks, with 46 deaths in the interval. The people were landed, and from this time the attacks diminished, the last being a mild one on April 30th. The greatest mortality was in the night, April 10th-11th, when forty deaths occurred. It was estimated that there had been from 500 to 600 cases of developed cholera, and that from 200 to 300 had died, one steward, two sailors, and three firemen died, but none of the cabin passengers were affected.

The steamship "Virginia" left Liverpool with emigrants on May 4th. On 12th three of them died of cholera, eight more on 13th, and seven on 14th. On 22nd, when the passengers were removed to the "Falcon" quarantine vessel at New York, the deaths had amounted to fifty.

Similar facts are recorded with regard to the steamship "Union," "Peruvian," and "Helvetia."

The "England," "Virginia," and "Union" were all very close to the same point in the Atlantic when cholera appeared in them, viz., lat. 48° 50′ N., and long. 28° 40′ W., and the "Peruvian," being a steamer also and sailing about the same time as the "Union," must have passed over nearly the same track as she did, and consequently in the vicinity of the same locality where the others contracted the disease.

The foregoing facts connected with the diffusion of the cholera epidemic in 1865-66 in Europe, cover a sufficient period to bring out many relations epidemiologists seldom concern themselves with, but anyone who attempts to explain the spread of cholera, whose theory does not account for every one of them, without straining the evidence, may rest assured his speculations are faulty and require emendation.

The outbreak of cholera at New Orleans, and in 1873, was the commencement of the epidemic which overspread the valleys of the Mississippi, Ohio, and Missouri in the course of the summer of that year, but which nowhere reached the Atlantic coast, was of the same description as to origin as the epidemic at Southampton in 1865. The first cases occurred in persons who had been in the country for long periods. Up to the beginning of April, 31 had been met with of which two only recovered. In very few instances had any of these had communication with those immediately preceding. The members of the Board of Health, after inquiring into every circumstance connected with the earliest and subsequent attacks, came to the conclusion that no vessel had arrived recently in which cholera had existed, and that it was attributable to factors acting locally, and had not been imported.

In 1883 cholera appeared in Egypt, and, as was expected, extended into the Mediterranean the following year, where it broke out at Toulon. The first case appeared on June 14th 1884, in a seaman on board the "Montebello," a line of battle ship, lying in the Southern Division of the Harbour at Toulon, and the following day another who was quartered in the same part of the ship was attacked. Neither of those men had been at sea for many months, the former died in eight days of consecutive fever, and the latter in eighteen hours of Algide cholera. On the 21st a case occurred in the Lycée, an establishment in the centre of the town, and a long way from where the "Montebello" lay, this case proved fatal in six hours. The population were dismayed, and the students at the Lycée were dispersed immediately. On the 22nd there were nine deaths from cholera, and from this the disease increased, though but slowly at first, and it gradually extended through the southern districts of France.

The three instances given above show that the efficient cause of the epidemic of malignant cholera can be conveyed to localities a great distance from where it is already prevailing, in sufficient quantity to generate an epidemic, without being carried by man or fomites.

In other instances persons coming from a locality where cholera was present, and with the disease either active or incubating, have arrived in a new one where it was impending, or where some sporadic cases may have actually occurred. Under such circumstances the latter are usually put aside as merely cholera nostras, and hence of no significance, and it is forthwith assumed that the fresh arrivals imported the germs of the disease and originated the epidemic which followed.

Before this inference can be established, however, it is clearly necessary that the possibility of the epidemic having arisen altogether independent of the arrival of the sick must be excluded, which the evidence usually presented does not permit of being done. The only other supposition compatible with the facts is that it is conveyed by currents in the atmosphere, not necessarily those experienced on the earth's surface, but by others at some elevation, often moving in the contrary direction. The experience of ships at sea has now accumulated *sufficiently to show* that the efficient factor is air-borne, and active there as well as on land, whenever it meets with the necessary conditions to develope it.

Ships present cholera very differently under different circumstances; some leaving a place where it is prevailing may have an outbreak immediately which disappears within the incubation period, and the remainder of the voyage passes without any further trace of it; others are attacked after they are at sea beyond the incubation period, but the outbreak terminates in a few days as in the previous category; in others again, the disease, instead of diminishing increases in frequency, and generally also in severity, and there may be a terrible epidemic, as in the case of the "England," lasting to the end of the voyage. Ships with cholera present much the same combination as those with yellow fever as regards the two diseases; any number of yellow fever cases may be put on board a healthy vessel, and they will run their course without extending to anyone on board, but if she have the peculiar condition of bilge which causes yellow fever, everyone on board, or who may visit her, who may be exposed to the emanations from it will be liable to contract the disease; similarly, if a ship have merely an outbreak of cholera on sailing, or a limited one, as noticed above, some time after sailing, no further trouble is likely to ensue, but if there be deficient ventilation, bad food and water, and a want of personal cleanliness among the passengers, and especially if there have been bad weather, and the least inattention to the removal of the evacuations, both of the sick and those in health, a focus of the disease is rapidly generated, as was the case in the "England," and to a lesser extent in many of the vessels carrying emigrants or coolies. For this reason the earliest opportunity should always be taken to remove every person from a vessel with a focus of cholera on board, until she can be thoroughly disinfected and cleaned.

The chief factor of cholera being thus carried by atmospheric currents, cannot be excluded from any country, and, where it has been distributed over any area, it excites the disease directly in many persons who are predisposed to it, and forms foci of it whenever it finds localities suitable for its increase; these are often very limited in extent, not embracing more than a single house, or even a portion of a house, or ship; the mortality among the steerage passengers in the latter is often very great, while the cabin passengers and all the crew have scarcely a case. Such foci are always badly ventilated, and the emanations arising in them acquire much greater density than in the open air; as a natural consequence the clothing of those who reside in them absorbs an amount of the emanation sufficient to produce cholera in susceptible persons outside until it has been dissipated by exposure; those so affected, however, and the others who have contracted the complaint apart from such foci, do not seem to have any such influence, it being not the body but the emanations from the locality which generate the disease.

Cholera, therefore, cannot be excluded from any country by general quarantine. All that can be done is by hygienic measures to improve the health of the population, and to remove the conditions which favour the formation of foci.

The placing ships which arrive with cholera on board under observation, removing their crews and passengers to suitable localities on shore until the disease ceases among them, are very proper precautions and may prevent a small amount of the disease among the surrounding population, but can never prevent an epidemic if the necessary factors be in progress.

J. Ashburton Thompson, M.D., D.P.H., &c., read a paper on

Australasian Quarantine.

This interesting paper we are bound to publish in abstract. The speaker said that the amount of traffic which has to be dealt with, is an important consideration in all questions of practical quarantine. The Australasian Sanitary Conference of Sydney, N.S.W., 1884, was attended by delegates of each of the six Governments, and by the speaker; their resolutions were unanimous; accepted by each Government, and presented to each Parliament; the principles embodied in them have not been modified since 1884, and are, therefore, those received in Australasia at the present day. The speaker then gave definitions of ancient quarantine, of quarantine, of limited quarantine. Medical inspection was the outcome of England's local conditions, is exactly suited to them, not necessarily suitable, therefore, where local conditions differ from England's. Proposition I.: The degree of protection which quarantine measures can afford varies inversely with the ease of communication between the infected country and the country to be defended. Difference between English and Australasian conditions described. The Conference rejected ancient quarantine as a principle of action, and on account of easy and daily interchange of population between the six territories, decided to regard Australasia as constituting one epidemiological tract, and (consequently) to relinquish all quarantine as against each other. Then, before adopting resolutions which would affect others, put themselves in order by declaring—in Proposition II.—quarantine can yield protection commensurate with its cost only to countries whose internal sanitation is good; and they recognised defects inherent in all quarantine measures by declaring—in Proposition III.—the function of quarantine is not to exclude infection but to lessen the entering number of foci of infection—and thus made it clear that exclusive reliance was not placed by them on quarantine as a defence against imported disease. Having thus indicated what should be refrained from, he proceeded to say what should be done. Aphorism: Nations whose internal sanitary organisation is not perfect cannot afford to refer the observation of suspects to the country at large. Decided consequently that limited quarantine should be employed against ships actually carrying cases of exotic disease—that is, that vessels and equipment should be cleansed forthwith and held for delivery to owners at earliest possible date; but that the ship's company should be detained in isolation for periods slightly in excess of recognised clinical incubation-periods. Medical inspection thus rejected as a principle of action not less than ancient quarantine, but still not inconsiderately; when imported disease is one already familiar ashore, the circumstances seem to resemble England's, and then medical inspection must (not might or could) be used. Accordingly, in case of scarlatina or the like, the patients are removed to ordinary isolation hospital (not quarantine), quarters cleansed, and the ship discharged in the usual way after five or six hours' detention. These principles are strictly adhered to by the Government of New South Wales since 1884. If not quite so closely by the other five Governments, the reason is probably political rather than commercial or scientific.

After this paper discussion was invited.

Dr. Rochard, of Paris, made a few remarks.

Dr. Rochard was followed by Dr. Felkin, of Edinburgh, who gave a very brief and interesting account of the preventive methods in use among certain of the White Nile tribes. Dr. Felkin pointed out that syphilis was known to be prevalent among the Arabs, and to follow them about in their wanderings. He stated that certain Central African tribes had actually stamped it out by methods of inoculation, closely allied to our vaccination. They employed a mode of inoculation that was compulsory upon both sexes before marriage, and the penalty for cohabitation before subjection to the ceremony was simple and drastic—it was death. The result had been the virtual stamping out of syphilis among these particular tribes. Where the disease appeared it ran a very modified course, and without tertiary symptoms. Cholera, to Dr. Felkin's knowledge, has penetrated as far as Uganda and Uynoro, and there the natives recognised the value of preventive methods. On the last occasion they not only evacuated their villages, but burnt them, with the result that the disease was arrested.

The meeting cordially agreed with Dr. Felkin that we can learn from so-called uncivilised tribes a good deal.

The discussion was then carried on by Dr. Simpson, of Calcutta; Dr. Hewitt, of Minnesota; Le Duc de Nantes, and Dr. Thorne Thorne.

Dr. Simpson considered Inspector General Lawson's cases, as given in his paper, unfortunate ones, and said that everything went to prove that there is no danger of cholera being brought to Europe by sea. India, he said, was considered to be the starting-point of cholera, but India had three populations—the Hindoos, the Mohammedans, and the Europeans. The Europeans who travel are not very subject to cholera; the Hindoos, who are immensely subject to cholera, do not travel at all, because they would lose their caste. The Mohammedans are the real danger, and Mecca or Medina may be looked upon as a permanent threat to European security.

Dr. Hewitt, of Minnesota, said that all the cases of infectious disease, taking small-pox as a type, that penetrated into the interior of Minnesota came from New York, and chiefly from Liverpool. Quarantine and medical inspection might do much, but not unless they were properly organised. A system of organisation on each side of the channel, and a local office in the country in communication with the port authorities is wanted. He gave, as an example of preventible disease, the story of an epidemic of small-pox, distinctly traceable to the clothes of a woman, not herself a victim, who had, however, been in contact with sufferers on the other side of the channel.

Le Duc de Nantes, Dr. Thorne Thorne, Brigade-Surgeon McGann, and Professor Brouardel all spoke, and the discussion was chiefly directed to the practical good to be obtained from a system of strict quarantine. Brigade-Surgeon McGann came to exactly the same three conclusions as Surgeon-General Cunningham's paper had indicated. Professor Brouardel remarked upon the foolish and vexatious arrangements at Malta and Gibraltar.

At this point the great French scientist vacated the presidential chair in favour of Dr. da Silva Amado.

Sir Joseph Fayrer had nothing to say in favour of existing arrangements at Malta or Gibraltar, but said that with all the ordinary hygienic ideas of the French he was in entire accord—a fact which he had previously found out in Rome in 1881—but that he could not think their notions about the efficacy of quarantine were serviceable.

Dr. Stokois, of Amsterdam, spoke in complimentary terms of English sanitary measures in India, and Dr. Robert Pringle wound up the discussion where Surgeon-General Cunningham had begun it, by strong testimony to the uselessness of the quarantine system.

The discussion was resumed at two p.m., with Sir Joseph Fayrer in the chair, by speeches from Surgeon-General Cook, Dr. Robert Grieve (of British Guiana), Dr. Ruijsch (of the Hague), and Surgeons-General Ewart, Staples, Cayley, and Beatson.

Surgeon-General Cunningham summed up briefly. The general condemnation of the quarantine system left him, he said, very little to say. Quarantine could only be logical if it could be proved that diffusibility of disease was commensurate with increased facility of inter-travel. All history showed the opposite. Steamboats and railways had not increased the spread of cholera; our growing communication with India—the home of cholera—had not increased it: the theory of quarantine was as wrong as its practice was faulty.

SECTION II.—BACTERIOLOGY.

Professor Lister began to address the audience soon after ten a.m., and in the course of his remarks regretted the absence of Pasteur and Koch, who were hindered from being present by ill-health and engagements respectively. The President referred to the valuable work which had been done since the 1881 Congress. Koch's new cultivating methods and the discovery of the tubercle bacillus, also the extraction from tubercle cultivation of tuberculin, which may be looked on as of great pathological interest, even if its curative nature is not proved. Pasteur's work on rabies has also been a feature of the past ten years' work. The phagocyte theory, the immunity produced against tetanus by the injection of inorganic chemical substance, and the injection of rats' blood into the mouse producing immunity to anthrax were also mentioned by the President as samples of valuable work during the last ten years. After strongly advising the members to visit the Bacteriological Museum, and regretting the time allowed to the several papers would be so short, he called upon Professor **Laveran**, of Paris, to read his paper on

"The Etiology of Malaria,"

of which the following is an abstract:—

The hæmatozoon, described by the author in 1880, has since that date been recognised by many other observers. Its morphology is now well known; the chief forms which it assumes are as follows:—

1. Spherical Bodies.—The diameters of these bodies vary from 1 μ to 10 μ. They adhere to the red blood corpuscles, which become paler in proportion as the parasites grow. They possess amœboid movements, and are pigmented.

2. Flagella.—In the fresh blood are sometimes seen on the borders of the spherical bodies, when completely developed, flagella in variable numbers. These move actively. At length the flagella become detached from the spherical bodies, and, when free, are lost in the midst of the red blood corpuscles.

3. Cruciform Bodies.—These are cylindrical elements, pointed at the extremities, measuring from 8 μ. to 9 μ., deeply pigmented, and not endowed with movement.

4. Rosette-shaped Bodies.—These are regularly-segmented bodies, and contain a little pigment in the centre. After a time they become spherical and disintegrate.

5. Lastly, in the blood of patients suffering from malaria are deeply-pigmented leucocytes.

The flagella can only be demonstrated in fresh blood; the other forms, however, are well seen in preserved blood (microscopic slides shown). The blood in paludism is easily studied by rapid drying and fixation of the specimen by heat, followed by staining with a concentrated solution of methyl blue or gentian violet; a double staining can be effected by successively immersing the specimen of dried blood in concentrated aqueous solutions of eosin and of methyl blue, whereby the red cells assume a rosy hue, and the leucocytes, together with the parasitic bodies, are coloured blue. Nuclei have been observed in both the spherical and the cruciform bodies. Two, and even three, different varieties of this hæmatozoon have been described (polymorphism).

Similar hæmatozoa have been found in different animals —frogs, lizards, marsh tortoises, birds. In many species of birds there is to be found a hæmatozoon so similar to that of paludism, that most observers regard the two forms as identical. The similarity is very marked, yet several points of difference exist; thus—in the blood of birds the cruciform bodies are not found; the parasitic elements are endoglobular, and never become free, as is often the case with the true paludic hæmatozoon; and the amœboid movements of the spherical bodies are much less notable in the case of the organism found in birds' blood. On the other hand, this latter hæmatozoon has been observed in birds living in non-marshy regions, and it frequently causes no inconvenience to its host, and the inoculation of blood containing this hæmatozoon has given only negative results. Yet the study of this organism may be expected to throw light upon many obscure points in the life-history of the true hæmatozoon of paludism, with which it presents so many points of similarity.

Professor **Celli**, of Rome, then read a paper on "The Parasites of Red Blood Corpuscles." These papers were listened to with much interest, and Professor **Crookshank** was then called on to speak. He congratulated Professor Laveran on his brilliant paper, and agreed in thinking that malaria was probably due to animal parasites; the evidence was in favour of the bodies described by M. Laveran being the cause, but it must not be forgotten that they are also found in healthy animals.

Mr. W. **North** said there was no doubt that there are peculiar changes seen in malarial blood, but he could not believe that malaria was due only to these changes. The plasmodium has never as yet been discovered in air, earth, or water, and no results has ever been obtained by injection of undoubtedly malarial soil. He thought malaria might be due to a higher organism than a bacillus in the blood. Simple surgical operations in tropical climates were often followed by intermittent fever. He did not think the cause to be a parasitic one, but more likely to be a constant "hammer hammer" on the thermo taxic nervous system of some climatic condition.

Professor **Hueppe**, of Prague, agreed almost *in toto* with Laveran, and Dr. **Anderson**, of India, objected in strong terms to malaria being put down to climatic or "chill" influence.

Dr. **Anderson**, of Mauritius described in an interesting manuscript how Mauritius was first infected with malaria, and how the infection could be traced step by step from the original spot infected.

M. Professor **Laveran** and Professor **Celli** then replied shortly.

The **President**, in summing up, thought the evidence to be in favour of Professor Laveran's valuable paper.

Professor **Hueppe**, of Prague, then read an important paper on "Asiatic Cholera and his Researches on the Comma Bacillus." He described its cultivation on different media, and its behaviour under various conditions. He also described his experiments on lower animals, in which he was able to produce death, which is a distinct advance on Koch's researches. He also described effects produced by the elaboration of poison produced by the bacilli in the intestine.

Dr. **Klein** proceeded to show that his experience was not in accordance with these views. He did not think comma bacilli always occurred in sufficient quantities to produce cholera. Uniform numbers of bacilli are not always present in cholera. Dr. Cunningham, of Calcutta, had in ten carefully examined cases failed to find any comma bacilli whatever.

Dr. **Klein** has also noticed that comma bacilli, described by different authors, have differed considerably in their actions; such as in plate cultivations, and in rapidity of growth.

Dr. **Cunningham** found eight different species of comma bacillus, these differences being maintained in sub cultures. Lantern slides of several of these species were shown. These species, when treated in the same way, differed in many respects. Comma bacilli are also found in mucoid tissue of healthy apes and guinea-pigs.

Professor **Max Gruber**, of Vienna, at some length, made an important speech, in which he disagreed with the last speaker, considering that the comma bacillus as the cause of cholera is almost proved, although in some minor details he had not obtained the same results that Professor Hueppe had described.

Dr. **Bruce**, of Netley, injected a pure cultivation of cholera bacillus into guinea pigs and they died. He injected the same into rats and they did not die; he did not agree with Professor Hueppe in thinking that the comma bacilli formed spores. He found that comma bacilli grew well inside eggs, and will live there longer than anywhere else. It has been stated that 5 c.c. of such an egg cultivation kills guinea pigs in forty minutes, but he found that many guinea pigs did not die even after several days. This was mentioned to show how experiments by different authorities differed in their essential points. He pointed out how seldom it was that other authorities differed from Koch's published experiments.

Professor **Hueppe**, in replying, said he had observed most of the points that Dr. Klein had mentioned, and that although we still wanted more evidence, he thought we were on the best way to the truth.

Dr. **Klein** again spoke to make the point stronger with regard to the maintenance of the differences of the several species in their sub-cultures.

Professor **Miller** then read a paper on "The Mouth as a Focus of Infection," in which he described the bacilli he had cultivated and their several actions, among others micrococci in the dental tubules, leptothrix, thrush, micrococci of foot and mouth disease, and the bacillus of Sputum septicæmia, were shown on lantern slides and described.

Dr. **Sewill**, of London, then spoke of the bacteriology of dental caries, with photographic demonstrations. Caries, he said, was due to pressure, acid, or organisms.

Professor **Grüber** described a new pyogenic micro-organism, and the **President** remarked thereon.

Professor **Crookshank** spoke shortly of a new bacillus found in acute abscess which he thinks resembles in many ways that found in scarlatina and diphtheria (accompanied by suppuration) by Klein. He will show the microscopic appearances on Wednesday in the Bacteriological Museum. He also showed lantern slides of streptococcus pyogenes hominis and bovis, pointing out the differences. He considers the streptococcus erysip. to be distinct, although similar, to the former.

Mr. **Ballance** then read a paper on "Cancer as an Infective Disease," and described some transplanting experiments he, in conjunction with Mr. Shattock, had performed. These have, so far, had negative results with regard to transplanting from man to animals, although it has been done successfully on several occasions from dog to dog. He pointed out the geographical distribution of cancer, it being especially prevalent along the course of rivers which overflow their banks. Cancer has been increasing rapidly in the last few years. In conclusion, he thought that there were cogent reasons for believing cancer to be a micro-parasitic disease, and no other can be intelligently substituted for it.

Dr. **Delépine** then read a paper on "Psorospermosis and its Relation to Malignant Tumours," demonstrating his paper by some beautiful photographs. Psorosperms are best seen in malignant disease of the liver in rabbits, but they have not been cultivated. They are ovoid bodies, which differ in their relative size. The author could not prove they were the cause of cancer or that they were even at all times present.

As time was now exhausted, the **President** remarked that the other papers must be taken as read.

During the morning the room was always full, and at times overcrowded, the members evidently taking a keen interest in the transactions of this section.

Several times the photographs taken by Mr. Pringle of microscopic objects were loudly applauded for their excellence.

SECTION III.—THE RELATION OF THE DISEASES OF ANIMALS TO THOSE OF MAN.

The President, Sir **Nigel Kingscote**, K.C.B., in opening this section, said: My first duty, on taking the chair of this very important and interesting section of the first International Congress of Hygiene held in the United Kingdom, is to offer to you on behalf of the Organising Committee and the Council of the section a cordial welcome to our meetings. The subjects we have to discuss are of the greatest importance, and I think myself happy in having been honoured with the presidency of this assemblage. The title of our section is sufficiently indicative of its scope and object. It is only of late years that the relation of the diseases of animals to those of men have been systematically and scientifically studied. It would be inappropriate for me to attempt to summarise the stages of development or to pass in review the various diseases which have been shown to be inter-communicable between men and animals. As to these, as for instance rabies and anthrax, the evidence appears conclusive. Others are perhaps still within the range of speculation. On all these diseases we are fortunate in having some of the highest living authorities here to instruct us. There can be no doubt that the anatomical and physiological relations between man and the lower animals are sufficiently close to justify the presumption that they are liable to the same class of diseases, and a most important subject is the question of susceptibility. As will probably appear in the discussion the whole question seems to resolve itself into the survival of the fittest, and we must consider the best ways of combating the invasion of the human body by the many varieties of self-multiplying alien germs and external morbific influences which prevent the individual life from completing its normal course. Thanking you for your patience, I now call upon the Corresponding Secretary to read the general regulations respecting the sectional discussions, etc.

The regulations were then read, which limited readers of papers to fifteen minutes, and subsequent speakers to ten minutes.

The Chairman then called upon Dr. **Roux**, Pasteur Institute, to read his paper, which contained an elaborate account of the methods and results obtained at the Pasteur Institute in the preventive treatment of rabies. Afterwards the Chairman called upon **George Fleming**, C.B., F.R.C.V.S., to read his paper on

"The Propagation and Prevention of Rabies."

It is now generally accepted by those who have most carefully studied the subject that rabies is a purely contagious disease, due to a virulent principle or specific agent, and is, as a rule, transmitted from a diseased to a healthy creature by inoculation. The specific agent, when introduced into the body of a susceptible animal, more particularly localises itself in the nervous system, and after a certain period, which is somewhat indefinite in accidental inoculation but definite in experimental inoculation, causes such disturbance in the functions of the brain and spinal cord as to give rise to well marked symptoms and a morbid condition that, it may be asserted, invariably terminates in death.

Inoculation and infection occur through wounds, which are generally inflicted by the teeth of creatures affected with rabies.

Of all the domesticated animals which may become affected, the dog is certainly the one which is by far the most frequently attacked, and it is the one which perpetuates the malady; it is undoubtedly the chief, if not the only, propagator of the scourge in this and other countries; and it is, therefore, exceedingly probable, nay, certain, that if the canine species were completely freed from rabies, the disease would be no longer known.

Recognising this fact, and in view of the constant virulency of the saliva of rabid animals, and consequently of danger from their bites, and the serious consequences resulting therefrom, the importance of sanitary measures applicable to this animal cannot be over-estimated. In the interests of mankind, no less than in those of the domesticated animals, and particularly of the dog itself, this very alarming, most painful, and always fatal disorder should be suppressed. And of all the known contagious diseases, rabies is the one which can be most easily and quickly extinguished, provided proper measures are prescribed, and are carried stringently and energetically into operation.

The measures necessary for the extinction of the disease must be based on the fact that the dog is the chief, nay, sole, propagator of rabies; that the contagium or infecting material is conveyed from the diseased to the healthy by means of bites (other means are so exceedingly rare that they may be left out of consideration); and that to free a country from it, all rabid and suspected dogs should be destroyed, certain restrictions maintained for a limited period, and only dogs from other countries exempt from rabies allowed admission. Dogs coming from infected or suspected countries, should undergo a period of quarantine equal at least to the longest period of latency of the disease.

That the disease can be limited, or altogether suppressed by the enforcement of proper measures, there is an abundance of evidence to prove. Sweden, Norway, Switzerland, Baden, Prussia, Bavaria, Wurtemburg, and other countries have been freed from it by such measures; while countries in which it has never been seen, as Australia and New Zealand, are preserved from its invasion by such precautionary measures as quarantine of imported dogs, or, as in Sweden, total prohibition of importation of dogs.

That the dog is the chief sufferer from, and, it may be asserted, the sole propagator of the malady, is amply proved by every day experience; but the following table, showing the number of cases of rabies in England during the four years 1887-90, and the number and species of animals affected, affords further evidence:—

Kind of Animal.	1887.	1888.	1889.	1890.
Dogs	217	160	312	129
Cattle	11	2	9	2
Sheep	5	7	11	—
Swine	3	—	4	1
Horses	4	5	4	2
Deer	257	2	—	—
Total	497	176	340	134

It will be observed that in 1888 and 1889, 90 and 91 per cent. of the animals reported as rabid were dogs, and in 1890 the percentage was more than 96. The animals other than dogs were infected by rabid dogs, and these infected each other; as the mad dog has always the strongest tendency to attack its own species, it follows that this furnishes by far the largest proportion of victims.

The suppressive sanitary police measures are, in the order of their importance: 1. Destruction of all dogs which are rabid, or which are suspected of being or becoming rabid. 2. The seizure and, if need be, destruction of all ownerless and wandering dogs. 3. All other dogs to wear a properly constructed and well-fitting muzzle while rabies prevails, and also for a period equal to longest interval of latency after the malady has been suppressed. 4. The imposition of a tax upon all dogs.

1. The necessity for the destruction of all rabid dogs is so self-evident that it need not be further insisted upon. The disease is incurable, causes much suffering, and the affected dog is, so long as it lives, so great a danger to other creatures that its speedy destruction is imperative. Dogs which are suspected of being rabid, or of becoming so, through contact with those which have been affected, must always be a source of grave apprehension and danger, and unless they can be kept under close and safe observation for a considerable time, should also be destroyed, seeing the risks incurred in allowing them to live.

A suspected dog may be defined to be one that presents symptoms resembling those of rabies, or which has been in conditions that have rendered infection probable or possible.

2. Wandering dogs are the chief agents in the propagation of rabies, for the reason that they are more exposed to contamination than those which are properly cared for, and also because rabid dogs, even when carefully guarded, seek to wander from home. In proportion as wandering dogs abound in infected countries, so is the disease prevalent. This is a well-established fact. In England, in 1888, of 160 rabid dogs, 64, or 40 per cent., were returned as stray ones; in 1889, of the 312 rabid dogs reported, 121, or more than 38 per cent., were evidently ownerless; while in 1890, 64 out of 129, or more than 51 per cent., were so returned.

Therefore, in order to limit the propagation of rabies, all wandering dogs should be secured, and, if not claimed within a certain period, destroyed.

3. Rabies being transmitted, as a rule, by the bites of dogs, and as in countries in which the disease prevails there can be no certainty when a dog is not infected, if it at all times be prevented from inflicting wounds by its teeth, it is evident that the danger of extension of the malady must be reduced to at least a minimum. Dogs can be hindered from biting by causing them to wear a properly constructed muzzle; and if it fits well, should cause very little, if any, inconvenience to them.

Rabid dogs sometimes escape from home without their muzzles, and the absence of these is an indication that they should be seized; and wandering and ownerless dogs are also known by their not wearing muzzles, and can therefore be secured by the police.

The value of the muzzle in suppressing rabies has been demonstrated on many occasions; and in serious outbreaks of the disease, its introduction has always coincided with a diminution in the number of cases, and the eventual extinction of the scourge. Its use is also coincident with a decrease in the number of cases of hydrophobia occurring among people during such outbreaks, and their ultimate cessation.

The evidence in support of this statement is so voluminous and explicit, that anyone examining it must be convinced as to the certainty of the fact. Two or three instances may be cited.

In the report of the Royal Commission on Rabies, it is stated that "in the city of Berlin special regulations are in force. In consequence of a severe outbreak in the year 1852, during which 107 dogs were destroyed as rabid, the Royal Police issued a decree to the effect, on July 2nd, 1853, that all dogs should be provided with a wire muzzle positively preventing the animal from biting, and to empower special persons appointed by the police for that purpose to seize and destroy all dogs not so muzzled; and, when the owner could be found, imposing a fine of ten thalers (£1 10s.), or a term of imprisonment. In the year following this decree only one dog was killed as rabid, against 97 in the previous year. The decree still remains in force, but does not seem to have been effectual in preventing the recurrence of epidemics of rabies; for the number of dogs killed as rabid, which up to 1863 had not exceeded in any year nine, rose progressively in the succeeding years, till in 1868 the number had reached 66, declining again to seven in 1870, only to increase in 1872 to 69. In 1875 a law was passed, extending to the whole of Prussia, for the suppression and prevention of animal disease, which provides that all dogs suspected of rabies shall be immediately killed, as also all animals which it is evident have been bitten by rabid animals; and that all dogs in a district which has been infected by an outbreak of rabies shall be confined, or, when abroad, both muzzled and led. The technical section of the Veterinary Board in Berlin are of opinion that the passing of this law, and not only the existence of the muzzling order in that city, is the cause of the extinction of rabies in Berlin; no case has occurred there since 1883."

In Vienna, we are informed that rabies was entirely suppressed by 18 months of stringent muzzling, but in the summer of 1886 the muzzling order was rescinded, and badges had to be worn on dogs' collars instead. In the following half-year there was only one case of the disease, but in the next half-year rabies became epizootic, and the muzzle had again to be worn, with the result that the malady soon subsided and disappeared. Consequently, the muzzling order is still rigidly and most beneficially enforced in Vienna.

In Holland, before 1875, rabies was prevalent to a very serious extent; but in June of that year the use of the muzzle was ordered, with the result that in the autumn the number of cases fell to 41; in the next whole year they were 55; in 1877, they were 14; in 1878, they were four; and in 1879, they were three. These and the cases which have since been reported only occurred on or near the frontier of Belgium, in which country the muzzle is not in use, though rabies is always prevalent. To such a degree, indeed, does the disease exist in Belgium, that in 1889 there were brought to the Veterinary School at Brussels no fewer than 94 really rabid dogs, 49 having been admitted during the winter quarter, and 45 during the summer quarter; and from January 1st to April 24th, 1890, 16 were taken there.

In the Grand Duchy of Baden, during the years 1871, 1872, 1873, 1874, and 1875, the number of cases of rabies were respectively 18, 37, 37, 50, and 43. Then the muzzle was rigorously applied, and in 1876 there were 28 cases; in 1877, three; in 1878, four; in 1879, two; in 1880, two; in 1881, two; in 1882, three; in 1889, two; in 1884, two. Since that year only one case has been observed, and that was a dog from Metz, where there were no proper regulations, and which had been contaminated before its arrival at Baden.

In Sweden, rabies was at one time a somewhat common disease, and from eight to ten people died annually of hydrophobia; but on muzzling being enforced, and the importation of dogs prevented, rabies has been unknown for many years, and no deaths from hydrophobia have occurred since 1870.

In England the value of the muzzle has been as well exemplified as elsewhere, though its application has always been extremely partial, being only employed in towns or districts where rabies has increased to such an extent as to create alarm, and removed immediately when the disease had for the time disappeared. No effective action has at any time been taken to suppress it in England or Ireland; in the latter country it is always more or less prevalent, and ever since it was first legislated for in England, it has maintained a permanent existence in the following 14 counties, viz., Chester, Derby, Essex, Hants, Kent, Lancaster, London, Middlesex, Notts, Surrey, Sussex (East), Sussex (West), Warwick, and York (W.R.). During the past year cases of rabies were reported for the first time in three counties previously free from it; these were Bucks, Norfolk, and York (E.R.); and it was re-introduced into Leicester after an absence of two years, and into Stafford, which had been free for one year.

The extent to which rabies has prevailed in this country may be judged from the loss of human life through bites from rabid dogs. It is stated that in England (including Wales), there have been 939 deaths from hydrophobia recorded during the past 38 years, the yearly average for the first sixteen years being eight, for the next 16 years 15, and for the remaining period ending in 1885, 45. Thus, the mortality has steadily advanced through more than 400 per cent. On the other hand, the Prussian preventive measures have reduced deaths from hydrophobia to a remarkable degree; for while in the decade ending in 1819 there was a yearly average of 166 deaths; in a similar period ending in 1886, there was a yearly average of 4½.

The value of the muzzle in suppressing rabies has been, perhaps, best demonstrated in London on several occasions, and especially in 1885. In the previous years hydrophobia had increased to a very alarming extent, as has just been mentioned, in England, and no steps worthy of note had been taken to check the mortality. For London alone in that year no fewer than twenty-seven deaths of people were reported as due to the bites of rabid dogs. A muzzling order was then enforced, and at the end of 1886 not a death was recorded. Unfortunately, the order prescribing the use of the muzzle was then rescinded, and in a few months a case of hydrophobia occurred in the south of London, soon to be followed by others, and in 1889 ten deaths were registered. In July of that year the muzzling order was again issued and stringently carried out, and rabies and hydrophobia once more disappeared.

In other countries where rabies prevails and dogs are not muzzled, though other measures, as the dog tax, medal on the collar, leading by a leash, &c., are enacted, the malady continuously manifests itself, and numbers of people perish from hydrophobia every year. We may give Belgium and France as examples. In the latter country the monthly sanitary bulletin shows to what an extent it is prevalent, and I need only refer to the two last which I have to hand, those for March and April of the present year. In March, 132 dogs and eight cats were destroyed as rabid, besides those sacrificed as a preventive measure; while 32 persons were bitten by mad dogs, as well as cattle and pigs. In April, 151 dogs and four cats were destroyed because of being rabid, and a large number were killed because they had been bitten by mad dogs, or were wanderers; and 47 persons were wounded by mad dogs. The reports of the Pasteur Institute show that by far the largest proportion of persons protectively inoculated are French. There can be no doubt that if the use of the muzzle were enforced generally and strictly throughout France, rabies would quickly vanish from the sanitary bulletins.

Belgium has tried all the other recognised measures except the muzzle, and yet the malady is as rife and deadly as ever. A Royal Commission was recently appointed to inquire into the subject, and the report addressed to the Superior Council of Hygiene in April last states that the regulations in force are insufficient, and while not contesting the value of Pasteur's preventive inoculations with regard to people bitten by rabid dogs, it is urged that there is something far more desirable, and that is the extinction of the disease in the canine species. For this object, the Commission insists upon the immediate adoption of the muzzle.

Senseless sentimentality has opposed the use of this article in a most extraordinary manner in this country, and one would be inclined to believe that there are people who care less for human suffering and human life than for a little inconvenience or discomfort to dogs. A well-fitting muzzle should cause very trifling inconvenience and discomfort, while ensuring absolutely safety from dog-bites. Repeatedly, rabid dogs have been brought to veterinary surgeons, wearing muzzles, and so rendered safe; as it is a well-known fact that a diseased dog will, in nearly every instance, allow those it knows to handle it and put on a muzzle. A leash only is no protection, for the dog can bite, and is as dangerous as if not led. Frequently rabid dogs on the leash are brought to veterinary surgeons. It is also perfectly obvious that a collar, no matter how embellished and be-medalled will no more prevent rabies, or hinder dogs from biting, than will a linen collar on a man's neck preserve him from small-pox or influenza. But we need not stay to notice these ridiculous notions.

4. The imposition of a dog-tax and registration is necessary to limit the number of dogs, and to ensure that every one has an owner, who should be held responsible for any damage it inflicts. From this measure no dog-owner should be exempt.

If an entire country is infected with rabies, then suppressive measures should be applied to the whole area, uniformly and energetically, until the malady is perfectly extinct. If only a portion of a country is visited by it, then it is questionable whether such measures should be limited to that portion only. If it were possible to keep all the dogs it contains within its boundaries, then such a step would suffice, if a certain zone around it were established beyond which no infected animals should pass. But it would be extremely difficult, if not impossible, to establish such a barrier; and to effectively rid a country of rabies, though only partially infected, the sanitary police measures should be applied to the whole.

That such a result is possible has been proved by the experience of the countries I have named, and from these examples, and what we now know of the disease, it may certainly be affirmed that rabies need only exist in a country which does not desire to get rid of it. The United Kingdom can quickly and easily free itself from it, and keep itself free if it cares to do so; and a heavy responsibility for the loss of human life rests upon those who oppose, or do not choose to adopt, the measures indicated. Continental nations with co-terminous frontiers should combine in a simultaneous effort to abolish a scourge which creates so much dread, and causes so much suffering and terrible death to man and beast. Such a consummation can be realized; and it only needs the will to effect it.

Dr. Hime, Bradford, said most who had studied Pasteur's method were convinced of its truth, and the fact that it was established on a scientific basis was absolutely certain: failure might occasionally occur, for in physiological processes there is not the absolute certainty which may be looked for in dealing with physical facts. As an Englishman, and one of many of his fellow countrymen who had availed themselves of the Pasteur treatment, he wished to give expression to the pleasure he had experienced in listening to Dr. Roux. With regard to Mr. Fleming's paper, he thought the collar with the name and address of owner was useful in affording certain means of tracing the disease. Muzzling as carried out in England was often a perfect farce. In York, the dogs on one side of the street were muzzled, while on the other side, which happens to be in another district, they are unmuzzled. Of course, it is impossible to prevent the mingling of these dogs and the disease may easily be spread, especially as an animal affected with the disease has a tendency to ramble. In the opinion of the speaker there would not be much improvement till there was a change in the law which allowed a dog its first bite. When a dog inflicts an injury on a human being the owner should be liable to prosecution. Dogs were not the only animals who spread the disease. Wolves, it was well known, often did so, and in his own experience 11 cases were traced to the bite of a cat. He was not aware in the case of Australian dogs of any evidence which proved that they were susceptible. Two and a-half years ago a dog of his own was inoculated with the strongest rabic virus under the dura mater, and was then put through a course of treatment with the same material and in the same way as human beings. That dog was still alive and had never had a symptom, while every other animal similarly infected and not treated had died.

Dr. Charles Drysdale (London) said he wished to express his thanks to Messieurs Roux and Fleming for their interesting papers. He had had the pleasure of seeing inoculations performed at the Pasteur Institute, and never were experiments made with greater care. *The way* the spinal cord was prepared, the patients treated, and the observations made had caused him to be ever since an ardent admirer of the accuracy of the French method. Though we in England objected to the establishment of a Pasteur Institute, we did not hesitate to take advantage of the method and send our patients abroad. As to the success of the method, when he found 92 per cent. of the most severe cases were so it seemed to him carrying scepticism too far any longer to doubt and it was a disgrace to us that we had not in the metropolis an institution similar to that existing in Paris. On the question of the prevention of rabies all must agree that it would be better not to have the disease to treat at all, and there is no reason why we should. All dogs in the island should be muzzled for a year. Then when we had got rid of the disease aided by our geographical position, it would be easy to prevent its re-introduction. The muzzling should, however, be universal muzzling in the island not at London and Leeds, and so on, leaving the intermediate towns and places without protection.

Dr. Redfern (Belfast) wished to emphasize the horrible nature of the disease. Very few diseases which are absolutely fatal in a short time produce so much suffering which cannot be allayed. When the disease exists it always goes on to a fatal termination. Though there is no doubt of the value and success of Pasteur's treatment in preventing the horrors of hydrophobia after a person has been bitten by a rabid animal, as Mr. Fleming suggests, there is no reason why anyone should be bitten, and with all deference, the suggestion was made to the Council to draw up a resolution, or, in some other form, give expression to the feeling of the meeting, that action should at once be taken by the legislature.

Sir Henry Simpson (Windsor) said: No doubt we shall all agree with Dr. Fleming that muzzling is an effective remedy, but I wish to call attention to the practical carrying out of a muzzling order, and to warn this section if they make a recommendation to the legislature to endeavour to make exemptions, they are likely to recommend in vain. I would say exempt sporting dogs, because for seven or eight months in the year these are being used for hunting, &c. Hunting and sporting generally leads to the employment of many persons and the expenditure of a considerable amount of money. If you ask men of wealth to sacrifice their hunting for a couple of years they will not do it, and the country would not sanction a measure which would result in such a loss of revenue to the whole of the country. Considering that sporting dogs are well cared for and that the owners are lovers of dogs, it would appear that they need not be muzzled, but that it should become a condition that they should be kept in charge by competent persons, and that any deviation from health should at once be noted, and an inspection made by a properly qualified veterinary surgeon, and, if necessary, the animal kept in quarantine.

Dr. Elizabeth Blackwell said: I beg to say that in the discussion between muzzles and Pasteur institutes there is one thing that appears to have been forgotten. Two years ago I visited the Paris Institute. I went to see the dogs that had been made mad to produce the virus for the inoculation, and saw several in various stages suffering extreme agonies, and I wish to point out that the establishment of a Pasteur institute involves the constant producing of madness in dogs, and in a Christian country there ought to be no question in preferring muzzling as a preventative of the disease.

Dr. Roux, as the head of the Paris Institute, officially stated that dogs were not, and had never been, used in the production of the virus for inoculation, and that rabbits alone were used.

Professor Ostertag, Berlin, said: I am exceedingly sorry that my knowledge of the English language does not allow me to follow the discussion so closely as I should like, but I have been able to gather that a large part of the discussion has been directed for and against the compulsory use of the muzzle. It has been objected that a muzzle is ineffective, because cats and wolves carry the disease as well as dogs. But that cases of this sort are rare is proved by the experience of Germany. Since the passage of the law regulating the contagious diseases of animals rabies has become a rare disease, and only occurs along the French and German borders. These laws provide that all mad dogs, and those suspected of madness, or even of having been bitten, are to be killed, and all dogs and cats within a radius of 15 miles must be kept in confinement for three months. In Berlin all dogs wear muzzles, and a case of hydrophobia has not been reported for 10 years. As a result of these laws a Pasteur institute in Germany is unnecessary.

Dr. **Nocard** (Paris) said: You have just applauded the interesting remarks coming from Roux and Bardach, giving the magnificent results of the Pasteur treatment for rabies after bites. I wish to speak of the prophylactic treatment, as applicable to domesticated animals. Your distinguished colleague, M. Galtier, announced some time ago that the injection of rabid virus into the veins of sheep and goats does not give rabies; but, on the contrary, it confers immunity. With M. Roux we have shown that the facts announced are true, not only from rabid saliva, but also from the nervous matter that one obtains from rabies of both forms. We have been able to preserve from rabies sheep, which had twenty-four hours previously had intra ocular inoculation performed quite recently we have made experiments, not yet published, proving, first, that injection into the veins of rabid virus does not give rabies to the horse family; second, if the quantity has been sufficient the animals inoculated have acquired immunity against rabies; third, it is possible to preserve animals which have had intra ocular injection performed twenty-four hours previously by injecting into the veins on different occasions with different quantities of rabid matter diluted with the rabies (dumb form), preferably on the question of prophylaxis of canine rabies. In principle I am entirely in accord with Professor Fleming: it is incontestable that when muzzling is rigorously applied rabies rapidly diminishes, but it is clear that the result is only indirectly due to the muzzle. Never has the muzzle hindered a rabid dog from biting. When one has seen a rabid dog break his teeth and even jaws on the bars of his cage, one understands that the dog would not retain one minute any muzzle that one may have been able to place upon him before the disease broke out. But the muzzle has the advantage of showing clearly to the police the dogs which have escaped from the house, or have no home, or who are not the objects of supervision. It is from this class that most rabid dogs are furnished. To seize and take them is to suppress the disease. One would get at the same result by ordering that every dog in the public street should be held in leash. This is what was done in Paris in 1888: 125 mad dogs were observed in the month of April. The Prefect of Police obtained an order as above. The measure was only applied six weeks, yet it sufficed to reduce from 125 to 25 the monthly number of mad dogs for the last half of the year 1888. There is no necessity for new measures to suppress rabies. It suffices to have the will, and to apply rigorously the measures prescribed in all civilised countries.

Professor **Brown**, London, said that he agreed with every word stated by Roux and Fleming, and if effect could be given to our knowledge by efficient legislation every one in his department would be only too pleased. But the carrying out of such legislation was extremely difficult. No Government could force such a measure. The matter lies in the hands of the public, and it would only be when public opinion was ripe for it that restrictions could be enforced by the law. It was a strange fact that the owner can never realise that his dog can become rabid. Restrictions which apply to others may be extolled, but you must not shut up the healthy animal of which he is the possessor; it is here the difficulty lies.

SECTION IV.—INFANCY, CHILDHOOD, AND SCHOOL LIFE.

In this section Dr. **Francis Warner**, M.D., F.R.C.P., read a paper on

The Scientific Observation and Study of Children in Schools, and the Classes into which they may be Grouped.

Modes of observing and studying their condition.—Assuming that it is desirable to know the condition of the children in a school, I am of opinion that two independent reports on schedule forms should be made of all children considered by the reporters as presenting points worthy of notice (1) by the teachers, visitors, inspectors, etc., (2) a scientific report based upon viewing each child while still and also while performing some simple action. My province deals with the latter method of report.

Children can best be seen in a large and well-lighted room; some of the London Board schools have halls admirably adapted for the purpose. The children being drawn up in ranks, a standard at a time, or in groups of about forty, the observer can view each individual. It is convenient to fix the child's eyes while he is under observation by asking each in turn to look at an object held up (I use a shilling at the end of a pencil). The trained observer can read off the physiognomy of the individual features and their parts, the facial action and expression, the eye movements, the balance of the head and body, etc., as quickly as a printed line. The children are then requested to hold out their hands straight, the action being shown them momentarily; the action and balance are noted as a further indication of the condition of the nerve-system. Finally, the palate is inspected in each case. At each stage children presenting deviations from the normal are asked to wait with the teacher. Any cases not picked out may now be presented by the teacher; the selected cases are kept, the rest are dismissed to the class-room. Each of the selected cases is then reviewed individually, and the schedule form is filled in, conditions printed on the schedule are ticked if normal, and deviations therefrom are verbally described. The teachers' report of mental status is entered or filled in by them afterwards. In this method a fairly uniform standard of observation can be maintained. A tape measure for the head circumference is useful; occasionally some detailed inquiries may be made, or some brief mental examination conducted with the teacher may be desirable, but, as a rule, no questions was asked of the child. Time prevents me from giving details of my methods of observation, and the signs observed, but these have been published. This method works smoothly and uniformly—going through 106 schools—with a minimum of trouble to teachers and pupils. The teachers generally acknowledged that the dull children in the school had been picked out by observation.

The following remarks are based upon the observation of 50,027 children in schools, which I undertook for a joint committee of the British Medical Association* and the Charity Organization Society. Analysis and study of these observations suggests various classes or groups of children we are concerned with, their scientific definition, their relative numbers, and distribution. A general analysis of the cases recorded is given in the table. I hope later on to make detailed analyses and to trace the conditions of defect through the standards of school life. The local distribution of defects in development is dealt with in a paper presented in the Section of Demography.

The classes or groups of children found in schools:—

(1.) Children well made, with a nerve-system acting well, and average or bright at school work.—Of these there were among the 50,027 seen—boys, 21,315; girls, 19,536; total, 40,851. Such pupils are the average or normal, hence they do not appear further in our tables. It is seen here, as in most other cases, that the girls are better than the boys. In this work search was made for the abnormal and pathological; it would be interesting to re-examine these normal children to determine points of relative excellence, searching for those best developed in body and mental faculty; this could be done. Scholarships would be most advantageously given to the best made children.

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* Towards the expenses of this inquiry grants have been made by the British Medical Association on the recommendation of their Scientific Grants Committee.

(2.) A group similar to the last, but slow at lessons (reported dull by teachers), *i.e.*, children presenting no defects to the observer who does not use mental tests.—It is important to differentiate such pupils from those with defective brain conditions. Some children's bodies and brains are well developed and sound though presenting no present faculty for school lessons, as the teachers' evidence shows. The mental examination and history may, on the other hand, show grave defects in intellectual and moral faculty. Many of this group were "eye cases," some "cripples," several were presented by the teachers, not having been noted by us. An analysis will be given in the full report.

(3.) Cases preventing defects of development of the body of various kinds.—It is not intended to represent children as exceptional from an educational point of view because some defect was present. Analysis of the various defects shows them to be of different importance. This subject has been dealt with in another paper. demonstrating their relative correlation with "mental dulness," "abnormal nerve signs," and "low nutrition" respectively.

(4.) Cases presenting abnormal nerve signs.—Their significance varies in two directions: the one group is associated with low development, the other with delicacy and nervousness; they vary in different schools, and depend much upon methods of training. Information concerning classes 3, 4, has been presented to division of Demography.

Certain groups of children are best defined by the association of two or more physical conditions.

(5.) Cases presenting defect in development and abnormal nerve signs.—Boys, 1,975; girls, 1,096; total, 3,071. Such children are usually dull at work, and are often at low nutrition.

(6.) Cases presenting defect in development and abnormal nerve signs, also indications of low nutrition.—Boys, 412; girls, 381; total, 793.

(7.) Eye cases.—Obvious defects, such as squint or disease were recorded, but no tests were applied to detect errors of vision or refraction. Ophthalmia was seen in certain day schools, but these cases were not recorded.

(8.) Deaf or partially deaf.—Boys, 34; girls, 33; total, 67. Tests for hearing were not generally used, but when a child was found deaf it was noted.

(9.) Cases crippled, deformed, or maimed.—Boys, 157; girls, 84; total, 341. These children varied greatly. Many are partially incapacitated for life, others only temporarily, some are mentally dull, others bright; they also differ greatly in physical health and strength.

(10.) Epileptic.—Boys, 32; girls, 23; total, 54. These cases were asked for in every school. Any case with a history of epilepsy or fits was recorded for what it was worth. It would appear that most epileptic children are frequently absent from school.

(11.) Cases selected as exceptional in mental status.—This group includes cases when the results of observation coincided with the teacher's opinion as to mental defect; it includes many imbeciles, obvious brain defects and disease, while less serious cases are also given. It is difficult to define what physical conditions alone indicate the child as unfit for average training, and I think an *arbitrary* attempt to do so must fail. Speaking generally, I would suggest that classes 5 and 6 need special attention in school, and should be known to the managers.

(12.) Children delicate, pale, or thin (low nutrition).—This condition shows a high degree of correlation, with defects in development and nerve-signs, also with mental dulness. No inquiries were made in day schools as to the feeding of the children. The 2,003 children, with low nutrition, presenting the following co-existing conditions: Defects in development, 1,459; abnormal nerve-signs, 1,233; defects in development and abnormal nerve-signs, 793; dull in school, 797.

The study of children in school.—The general outcome of this work indicates the advisability of studying the pupils in two ways: (1) by mental tests, and (2) by physical examination or inspection. For the gain of direct scientific knowledge it is desirable to note all departures from the normal types. It appears to be a great gain to note, not only points in development and physiognomy, but also the nerve-signs indicated; those postures or balances and movements or actions which were noted as signs were selected after much labour in observation, analysis, and comparison, and they seem well suited for the purpose in hand. They are readily recognised, and can easily be taught by means of casts, diagrams, and demonstration.

Physical examination by inspection is useful (1) as a means of selecting cases for special mental report, (2) as supporting a report founded on mental tests only. The double mode of inquiry is specially necessary to detect certain cases; the mental test alone would leave out of view those nervous children who suffer much, but are usually bright at work and interested in it, and tend to pass the standards quickly; on the other hand, grave mental defects may occur with brains good for all other functions.

As a hospital physician, one sees many children, delicate, feeble-brained, children with small heads, nervous children with headaches, chorea, occasional fits, those partially deaf and blind, conditions without a tendency to a fatal termination, and not preventing a modified and adapted education—such children need provision for their training, without it they will probably tend to failure and incapacity in after life. They should be known and specially cared for.

In the course of the discussion which followed, Dr. SHUTTLEWORTH said he did not know why the honour of joining in the discussion had fallen to his lot, unless it was because he had had some extended interest in the subject of the examination of school children. Three years ago he had attended a meeting of the British Medical Association at Glasgow (1888), when the subject was considered. The work had been going on now for three years with considerable vigour. The committee of the British Medical Association, which consisted solely of medical men, had been reinforced by the Charity Organisation Society, which includes also other men interested in the question, whose knowledge and experience cannot fail to be a very great gain to the enquiry, and under the enquiries of these two committees the investigation has gone on apace. In the first year (1888) 3,000 children were reported on; now Dr. Warner has just given us a report of 50,000 cases, taken more especially from the schools of London and the surrounding district. They were much indebted to Dr. Warner for the zeal with which he has pushed the inquiry, who has been accompanied in many cases by the committee. He had been asked to bring forward the following resolution: "That according to the returns prepared by Dr. Warner on the feeble-minded, epileptic, etc., it would appear that an appreciable number of children, though not imbecile, are more or less defectively developed in brain and body. That for their training and education special arrangements are necessary; and that in the absence of such arrangements there is great probability of grave moral and mental deterioration." (Hear, hear.) It did not require many remarks from him to support this resolution. They had had an account of how very large a percentage of the children are more or less deficient in development and have abnormal nervous states—about 1·5 per cent. of the 36,370 children examined in the public elementary schools. He was sure we have a very considerable number of children who require special attention and instruction by special methods of teaching, and he rejoiced the Board schools were taking a step in that direction by the establishment of three special schools in London and the employment of trained teachers. And it will be important that the teachers should be persons who are capable of individualising their instruction, and that they should not think that one method of treatment would suit all classes of children. He thought that occasional medical inspection of the schools should be employed to supervise the teaching from time to time. Our country is not the first to move in this direction. Three years ago classes for exceptional children were formed in the public elementary schools of Germany, Norway, and Denmark. He had visited the schools in Christiania and Bergen, and the results there are as satisfactory as can be expected. In the Christiania schools not more than three hours daily instruction is given to these children, and much good has been done to their education. Not more than ten children are under the care of teachers—(1) a certain number of the children are able, after a year or two, to go back to the ordinary schools; (2) others, by careful treatment in these "auxiliary classes," reach a standard which enables them to go in for confirmation—the passport into Norwegian civil life. These results were so important that he thought they ought not to be neglected in this country. "In the absence of such arrangements," the children might not be useful members of society but might go to increase the criminal classes. Quoting from one of Dr. Waring's works, the excitable boy, always at home with a headache, might grow up without education, and so excitable that he might, in a moment of temper, do something which would bring him within reach of the law. Another case was that of a little girl who was always in trouble at school for stealing. Dr. Waring found that she was suffering from chorea and heart disease. When she was sent to a quieter school she got better and left off stealing. Fifty thousand children have been reported on, and he for one was anxious that this enquiry should extend to the provinces. Dr. Waring knows that in the schools of Manchester there are almost "exceptional children," as in London.

The British Medical Association has set aside a fund at their disposal with the view of carrying on this enquiry; it cannot be carried on without considerable expense and government ought to take it up. He thought the investigations were sufficiently telling to make a case to bring before Government. If the London School Board could prove that the benefit which results from the separate examination of these children, it seemed to him that it should be incumbent on the Education Board to provide special education for them. It therefore gave him much pleasure to move the resolution which had been made. (Applause.)

Dr. Graham Balfour seconded the motion, as representing the Charity Organization Society, and pointed out the great advantages gained by analysis of feeble-mindedness. It is necessary to make an analysis of each separate case, and then to direct the educational treatment accordingly. This paper seemed to mark a distinct advance in education in this country, but it was most important that the inquiry should continue to be carried on, the number of children examined not yet being sufficiently large.

General Moberley wished to give a word of testimony to Dr. Warner's kindness and carefulness to the children during the investigation in the schools over which he (General Moberley) accompanied him. Dr. Warner's selection had been very accurate. Many of the children had been under his (the speaker's) notice before, and he was glad that the School Board was combining with him in applying to the Government Board in order that the children should get some education. He hoped they would get a superintendent to look over the group of schools, in which he hoped there would be not more than 100 to 150 children each to begin with, for it was a serious matter that the children should be properly looked after. There was great encouragement to be derived from the success in other countries; they would have to teach the children cleanliness and such objects, and their physical welfare would have to be cared for in the hope of sending them back to the ordinary schools, perhaps not in as high standards as other children of their age, but at least in some standard, though possibly they may learn but little beyond such manual labour as will help towards their maintenance as citizens of this country. He was quite alive to the necessity of the medical examination of each child before he or she is admitted into the special school, and the medical officer will no doubt from time to time examine their condition to see the extent of the benefit obtained. He spoke with great hopefulness for the future.

Dr. Fletcher Beach pointed out the fact that in the "auxiliary schools" of Norway the children—(1) Are passed back after a time into the ordinary schools; (2) passed on for confirmation; or (3) sent home altogether, not being capable of being taught anything. If the School Board of London could improve half of the feeble-minded children they would be doing a great and good work. The Charity Organization Society had found many of these children drifting to the workhouses and criminal classes.

Dr. Foster, of Vienna, remarked that if the feeble and strong minded children were schooled together the result would be a lowering of the whole standard.

Dr. Jacobi, of New York, observed that there was one reason, which had not been dwelt upon sufficiently, why these resolutions should be passed. They wanted to advance the weak; so did he, but it is of equal or greater importance to protect the strong and the intellectual. Whenever both intellectual and unintellectual are found together in the same school, both the method of teaching and the result of learning will tend to a low average; having the weak and strong together, you do not benefit the former and you do harm to the latter by preventing them from realising their full possibilities.

Dr. Langdon Down said that the value of Dr. Warner's paper depended entirely upon the truthfulness on which his arguments are based. The basis is that there is a correlation between the physical conformation and mental power. It would be interesting to Dr. Warner to know that he (the speaker) entered upon a similar inquiry thirty years ago with regard to the physical conformation of idiots and imbeciles. "The condition of the imbecile is not simply one of mental alienation. It frequently presents very grave physical deterioration, and this physical alteration is as much a test of idiocy as is the condition of the mental power." He had himself been engaged in investigations with results confirmatory of Dr. Warner's inquiry. It was very satisfactory to have confirmed so completely the statements he (the speaker) made so many years ago. He dwelt at that time on the close relation between feeble-mindedness and criminality, and many years ago, when he investigated closely the physical and mental condition of the inhabitants of one of her Majesty's prisons, he was struck by the fact that a large number of the so-called criminals were really feeble-minded people. Whilst thanking Dr. Warner for his statistics, he was of opinion that the inquiry should be much more extensive and over more varied fields.

Dr. John Milson Rhodes, in supporting the resolution, said he believed the number of feeble-minded people was much larger than was supposed. He made inquiries some time ago and found that the census returns should be multiplied by at least three. On inquiry ir me recent cases he found only about one imbecile in five was returned as such. France, to its credit, is making provision for these children, there being now a Bill before the legislature to make each division of the country provide for these children, and he hoped that England would take up this subject at once, and make the lot of these little ones easier than it is at present.

Dr. PEEKE RICHARDS (Hanwell Asylum) stated that many of these feeble-minded children ended their days in the workhouses or prisons. A more thorough examination of the children ought to be made, and that it should be compulsory for every child entering school—whether Board, middle, or upper class—to be thoroughly examined by the medical officer, and for the result of that examination to be recorded. It would be an Augean task to make every child at present in school undergo this examination, but he proposed that henceforth all children entering school should be examined, by order of legislation, as is done with recruits entering the army or navy. These records would be of very great use. Slightly imbecile children of the lower classes, if properly taken in hand during school life, would tend to lessen considerably the number of admissions into the county lunatic asylums, and would not only be a great advantage to the State in general, but to the ratepayers in particular. (Applause.)

Mr. NOBLE SMITH said that some practical deductions ought to be drawn from the valuable statistics which had been placed before the meeting. The popular idea was that it did not matter much whether the child was deficient in physical development, because it would most probably, if not certainly, grow out of it. This idea was calculated to do a great deal of mischief. He had observed a large number of artisans, and had found out of batches of these adults going to or from their work that there were nearly as many with crooked limbs, especially legs, as with straight ones. Most of them were unfitted for the army or navy, and they are all heavily handicapped for the battle of life. He had no experience as to their degenerating into the criminal classes, but they certainly often become very discontented members of society. Among the classes who attend the more noisy mass meetings in Hyde Park, a very large number of crooked legs might be observed. To remedy these defects he urged that attention should be given to the improvement of the nutrition of children, and to the modifying of their work, bodily as well as mental. They ought to improve the homes of the children, and with better nutrition we should hear less of mental over-pressure.

Dr. STURGES read a paper

"ON THE EARLY RECOGNITION AND PROBABLE ARREST OF ST. VITUS'S DANCE IN SCHOOL CHILDREN,"

In the course of the discussion on Dr. Sturges' paper,

Dr. PRINGLE said all must appreciate Dr. Sturges' account of the misery of a child commencing with chorea. Dr. Sturges had done good service in calling the attention of the public to the early signs of this disorder. It is excitement rather than hard work which produces it. A boy under his (the speaker's) care got well and went back to his school, a high-class one, got on all right, and did his work well for three or four weeks, when he had a fight with another boy, and the excitement so upset him, that he again began with a severe attack of chorea. He could hardly agree with Dr. Sturges that it was comparatively harmless, because it may cause serious heart mischief.

Dr. MORRIS read a paper

"ON RINGWORM IN ELEMENTARY SCHOOLS."

On the discussion on Dr. Morris's paper

Dr. T. C. FOX pointed out (1) The excessive frequency of ringworm in London, (2) It is propagated by direct contagion, (3) Its great intractability when once established; and proposed the alternative methods of treatment that children when affected may be taken away to a separate place where education and treatment may be carried out together, but this plan is very expensive; or the children might be allowed to attend classes in the same rooms as the others, but kept separate, their scalps dressed with a germicide ointment, and they should wear special caps. They should be discharged earlier than the other children, so as to prevent them mingling with them.

In the course of the discussion on a paper by L. KOTELMANN on

"VERTICAL WRITING,"

Mr. NOBLE SMITH said he had taken part in the inspection of seats and desks some years ago, and his attention was called to the fact that the children attained their crooked position more by the sloping of the writing than by any fault of the desks or forms, which were better in London than elsewhere.

Professor GLADSTONE said he could not but believe that the position taken up by children in writing was very injurious to their eyes, and probably accounted for much of the defective vision in our schools, and he proposed the following resolution: "That as the hygienic advantages of vertical writing have been clearly demonstrated and established both by medical investigation and practical experiment, and that as by its adoption the injurious postures so productive of spinal curvature and short sight are entirely avoided, it is hereby recommended that upright penmanship be introduced and generally taught in our elementary schools."

This resolution was also proposed in German and French; proposed by Dr. Kotelmann, of Hamburg, and seconded by J. Jackson, Esq.

An amendment was moved by Mr. NOBLE SMITH that "to a very great extent" be substituted for the word "entirely."

This amendment was opposed by Mr. KEEVIL, who moved that the original reading be maintained.

On being put to the vote, 18 were for the amendment; 14 against. The amendment was therefore carried by a majority of four. The motion, as amended, was carried by 28 for to one against.

EMPLOYMENT OF CHILDREN IN THE UNITED STATES.

Dr. JACOBI, of New York, read a paper on "The Laws Regulating the Employment of Children in the United States of America." He referred to the progress that had been made in regard to limiting the age of children employed in factories, and in insisting upon compulsory education both in the United States and Canada. Most of the States did not permit children to work in factories unless they could pass in a definite educational standard. He claimed, at the same time, that whilst American legislation was based upon English legislation, particularly as established by the Consolidated Factory Laws of 1878, it was in advance of extending the age at which children were allowed to work in factories.

SECTION V.—CHEMISTRY AND PHYSICS.

There was a large attendance this morning when Sir H. ROSCOE rose to read his address. Amongst those present were: Professor Lehmann (Wurtzburg), Professor Gariel (Paris), Professor Gintl (Prague), M. Conrad Fetz, Dr. Konja, Dr. Carl Konja, Dr. M. Landesmann, Professor P. F. and Mrs. Frankland, and Dr. Tatham.

Sir HENRY ROSCOE said: The branch of the great subject of hygiene with which we in this section have to deal, viz., that of the relation in which it stands to the sciences of chemistry and physics, is one of primary importance and interest. Indeed, taken in its most general sense, the relation of the science of health to chemistry and physics will be found to include almost all the varied subjects which come under the cognisance of this Congress, for all vital processes are regulated by chemical and physical laws, and physiology may be defined as the chemistry and physics of the animal body. Hence the preservation of a normal condition, or of health, being dependant upon these laws, it is clear that our section is is the most important of all, for it is by obeying chemical and physical laws that health is maintained, whilst by neglecting to follow them we court disease and death.

But whilst as chemists and physicists we may claim credit for laying the foundations of the edifice of hygienic science, we gladly admit that portions of the building have been raised by other hands, and heartily do we welcome the successful efforts which the biologist, the physician, the engineer, and the statesman have made to help us to complete the building up of a condition of things by which the amount of preventible disease is reduced to its possible minimum, and that of health and well-being increased to the maximum possible under the necessary circumstances of our lives.

As to the progress which during the last half century has been made towards the attainment of this end—he who runs may read. Those who can carry their minds back fifty years will be free to confess that, at that time, whether in England or abroad, the principles of sanitary science were recognised only by a very few men of "light and leading," and that any attempt to carry out these principles were, indeed, few and far between. Fifty years ago our notions of the nature of contagion, of the causes which lead to the spread of epidemic diseases were of the crudest and vaguest description. We then had no idea of the fact, now not only proved beyond doubt, but strongly impressed on the public mind, that both water and milk are fertile carriers of disease if contaminated even ever so slightly with infectious material.

In those days "pump" water was believed to be wholesome if only it were cool and sparkling, and water from a source now recognized as dangerously impure was preferred to the pure article which came from a distance in the city mains. Now the sanitary authority closes all doubtful wells, and municipalities incur vast expense in bringing home to every one a pure supply of this necessity of life. Still much remains to be done for an adequate supply—especially in rural districts where the village pump is too often the sole means of existence, and where that pump is not infrequently in close proximity to sources of dangerous impurity. Moreover, even where the supply is of good quality its quantity often fails in dry seasons from lack of any impounding system of the flood waters. That fifty years since our knowledge of these matters was limited is due to the fact that in those days chemists were unable to decide whether a water was harmless or dangerous. The methods of analysis were then crude and insufficient; and even now, when these methods have been greatly improved, the most expert analysts may find themselves in disagreement, on a mere chemical examination, as to whether a given water is fit to drink or not. The discussion of these methods of sanitation on Thursday next may, I should hope, contribute to the elucidation of these doubtful points.

Fifty years since no one realised that the existence of cesspools under their houses, of which there were then thousands in London, was a source of danger to the inhabitants. The idea of getting rid of and of utilising fæcal matter was laid hold of ages ago by nations, such as the Chinese, whom we in our wisdom term barbarians, whilst the civilised European waited till the middle of the nineteenth century before he discovered that if he would preserve his life he must remove from his neighbourhood the refuse which accompanies that life, and even now, at the end of the century, he is far from having solved the question of the best way of its removal, much less that of its utilisation. On Wednesday next we shall have an opportunity of learning the opinion of those competent to give it on the much vexed questions of the chemical and physical principles involved in the treatment of sewage; and if we can lay down, even in outline, what these principles are, our section will not have met in vain.

The question of air pollution, which will come on for discussion during our sittings, is a much more difficult though an equally important one. We can bring pure water into our houses by pipes, we can also take away the polluted water by sewers, we can see the fresh water running in, and we know, if our drains are in order—an assumption, it is true, and perhaps a bold one—that our dirty water at least goes away from us. In the case of the air, we cannot regulate the fresh supply so easily; nature, indeed, does much for us; indeed, if she did not, we should be badly off. We cannot see the air, whether pure or otherwise. Our sense of smell may, if it be sensitive—which is again an assumption often incorrect—possibly tell us that something is wrong, though it by no means follows that an odourless air is pure and healthy; but to ascertain how far the air is impure, and to express it in figures was, so far as concerns many of the most important of these impurities, impossible fifty years ago, and is only now beginning to be understood. But even were we able to detect the presence in the air of the spores of the as yet undetected influenza microbe we should be far from having a means of freeing the air from it. By filtration through cotton wool air can be obtained practically free from microbios, as well as from dust particles and fog, but such air filtration can only be adopted in a very limited number of cases, and is altogether useless for general purposes. One of those few instances is that of the House of Commons, where a system of air filtration has been successfully adopted, by which the air of the debating chamber has been preserved perfectly free from fog, as well as from microbios, if the doors are kept closed.

The discussion on town fogs and their prevention, which is to be introduced by Dr. Russell, will enable us at any rate to form an idea of the causes and possible mode of preventing these serious drawbacks to a city life. A scientific inquiry, if it does not at once succeed in finding a cure for the evil may, at least, point the way to prevention, and I shall be surprised if we do not find that the ultimate panacea will consist in using gaseous fuel and the electric light.

Another source of air pollution, more easy to grapple with, lies in the escape of deleterious gasses from chemical works and other manufactories. The removal of many causes of such pollution has been satisfactorily accomplished in this country under what are known as the Alkali Acts, or more properly the Noxious Vapours Acts. Thanks to the care with which these Acts have been worked both by the Government inspectors and the manufacturers themselves, the serious complaints which arose of nuisance due to the escape of acid and other noxious vapours are now no longer heard; and not only has the public been the gainer by the stoppage of the escapes which formerly occurred, but the manufacturers themselves have also benefitted, inasmuch as they have had their attention directed to improvements in their processes which have proved remunerative.

The great smoke question is one upon which I hope some light will be thrown by the discussion which will take place during our meeting. Much, doubtless, can be done in preventing the output of smoke from factories and other places in which large quantities of coal are burnt, but, after all, the smoky atmosphere of our towns is caused chiefly by the thousands of domestic fires, and at once to alter these so as to prevent smoke, or to insist upon gaseous fuel being generally used instead of coal, is to expect the impossible.

I have said that the foundation of hygienic progress is to be sought in the application of chemical and physical principles. This is true not only of the matters of every day experience to which I have already referred, but also of the most recent and astounding discoveries, showing the dependence of the health of the community on the actions of microbic life. Thus Pasteur and his pupils have proved that these actions on the host or body receiving the microbes as guests, are to be attributed rather to definite chemical products formed by the living micro-organisms than to the organisms themselves. For just as in the well-known instance of the vinous fermentation, the products of the action of the yeast plant on sugar are alcohol, carbonic acid, and subsidiary compounds, so each definite micro-organism—such, for example, as that peculiar to diphtheritis—engenders certain active chemical principles which are capable of effecting serious or fatal changes, characteristic of this disease, within the animal body. Hence the ultimate causes of epidemic disease rest upon a chemical basis, and as we find in a simple chemical an antidote for poisoning by any of the commoner chemical poisons, so it would appear that an antidote for hydrophobia, for example, is to be found in the complicated chemical products of the life of the micro coccus characteristic of this disease. How these antidotes—except in the most simple cases, such as acid and alkali and the like—act is as yet unknown. We do, however, know that the growth and life functions of this yeast plant are stopped in presence of an excess of the poison, alcohol, which it secretes, and this fact may help us to explain, to some extent, the protective action exerted by the chemical poison developed by many pathogenic micro-organisms. The elucidation of this subject, all-important for the health of the community as well as of the individual, is one of the most pressing scientific needs of the day. To isolate the various chemical products, to study their actions, both chemically and pathologically, is a necessary step towards the attainment of the end which we all have in view, viz., the prevention and cure of disease. Hence, it will be admitted by all, that whilst the determination of the morphological characters of micro-organic life is an essential preliminary, it is to the examination of the life-functions of the organism, and especially to those connected with the production of its peculiar chemical poison, that we must look for the complete solution of the problem; and therefore it is in the laboratory of the chemist, and by the application of chemical and physical methods of research that progress in these matters will, in the coming time, be made. So again, I say that the foundations of hygienic progress are to be sought in the application of the principles of chemistry and physics.

And now, gentlemen, I know that all well-wishers to this progress, whether English members or the foreign guests who have honoured the Congress by their presence, will rejoice to learn that we in England, determined no longer to lag behind our continental friends, are about to establish a National Institute of Preventive Medicine—(applause)—in which not only researches of the kind I have alluded to can be satisfactorily carried out, but where instruction in the numerous special branches of science, upon which the health of the nation depends, can be given. Those who have interested themselves in this movement feel that it is no less than a national disgrace, that whilst almost every other civilized nation has established an institute of the kind in its midst, we in England should stand alone inactive and supine. We believe that the necessity for such a national institute only requires to be made generally known to be universally acknowledged, and we feel confident that now having obtained the first step towards the attainment of our object, viz, recognition under license of the Board of Trade, the Council of the Institute will only have to ask in order to obtain the considerable amount of pecuniary support necessary for carrying on the work of the institute on a scale worthy of the country. This support must come wholly from private sources; for our Government, unlike that of many other countries, as yet holds aloof from supporting institutes of this kind however necessary they may be to the general well-being of the country. The time may not be far distant when different views will prevail, and when Parliament will consider it one of the first and most binding duties to support by Imperial grant an institution whose sole aim is that of increasing *our knowledge of the* conditions upon which the health of the nation ultimately depends, and of diffusing that knowledge widely throughout the land. (Loud applause.)

A vote of thanks to Sir Henry Roscoe was proposed by Dr. RUSSELL and seconded by Professor ODLING.

Dr. W. J. RUSSELL, F.R.S, then read a paper on

"TOWN FOGS AND THEIR EFFECTS."

The circumstances which led to the formation of fogs. Dust particles necessary for their production. Aitken's experiments on dusty, and on dust-free air. The smallness of the amount of matter capable of determining the formation of fog. Products of complete combustion capable of action as fog producers. Variation of the character of fogs, wet fogs, dry fogs. The meteorological conditions under which fogs usually occur, and the persistence of fogs above the dew point. Fogs which do not reach the ground, but exist only in the higher regions. The impurities in the air of towns, and their absorption by fogs. Estimation of sulphates, chlorides, and organic matter in London fog, and comparison of amounts with that in the air of the suburbs Quantitative determination of fog deposits, collected at Kew, Chelsea, and Manchester. Its examination and analysis by th Manchester Committee. Important and interesting character of these experiments. Evidence of the increase of fogs in London and other towns. Relationship between increase of dark fogs and consumption of coal in London. Effects produced by fogs. General effects on human subject, and question whether the death-rate is seriously affected by fogs. Effect on plant life. The experiments made at Chelsea, by Dr. Oliver, for the Horticultural Society. Evidence of the powerful destructive action of town fog on many kinds of plants, and the investigation of the nature of the specific poison which may exist in fog. The great action which fogs exercise of absorbing light and their special power of absorbing the more refrangible rays. Estimation of the amount of gas burnt in London to compensate for the light absorbed by fogs. The deleterious effects which must arise from this absorption of light. Comparison of the amount of sunshine in London with that in the neighbourhood, and some other places. Experiments on the distances at which objects are visible during a London winter. Discussion of the questions whether fogs can be abolished from towns, and whether, if not abolished, they can be rendered free from foreign matters.

Dr. Delépine exhibited a most ingenious apparatus[*] which demonstrated the possibility of avoiding any discharge of carbon from a chimney. We hope to be able to give an illustration showing how this desirable consummation is obtained.

A PAPER ON "THE AIR OF LARGE TOWNS: METHODS OF ITS ANALYSIS"

was contributed by the Manchester Field Naturalists Society (Dr. Bailey, Dr. Cohen, Dr. Hartog, and Dr Tatham).

A general and systematic investigation is being made of the composition of the air of Manchester in the different parts of the city. Special attention is being paid to the following points: (a) The differences of composition in the air of thinly and densely populated areas; (b) the relation between atmospheric impurity and prevalent sickness and mortality; (c) the extent to which smoke and noxious vapours are due to factories and dwelling-houses respectively; (d) the character of the air during the prevalence of fog.

The committee has devised a simple method for the estimation of the sulphurous and sulphuric acid in the air. It has been shown by its aid that during fog the proportion of sulphurous acid present in the atmosphere is enormously increased. The ratio of the minimum to the maximum amount found is as 1 to 26, the latter figure corresponding to a very foggy day.

[*] *This paper is described and figured at page* [illegible].

Analyses of snow on successive days showed that during a three days' fog rather more than 1½ cwt. of sulphuric acid per square mile was deposited in the centre; at an outlying station 1 cwt. of sulphuric acid and 13 cwt. of blacks per square mile was carried down during the same time. The solid deposits on leaves of shrubs have also been analysed, and the results amply explain the difficulty experienced in growing plants and trees in town. A series of observations on the clearness of the air, and on daylight intensity is also being made.

The committee is working in concert with a committee of the Royal Horticultural Society in London, and during the coming winter experiments in Manchester and the Metropolis will be carried on simultaneously.

Dr. C. Theodore Williams, who addressed the section on "Fog in Relation to Health," believed that London fog was not so fatal as many people had supposed. The fog certainly induced headache, bronchitis, pneumonia, etc., but he had known cases of asthma in which the patient had derived much benefit from inhaling London fog.

Mr. Ernest Hart said he was sure that Dr. Williams did not mean to imply that his experience of a few subjects of such a disease as asthma had any general value. To create or tolerate London fogs for the sake of a few asthmatics would be to burn down the house for the sake of roasting the pig. The mortality of London during the previous great fogs had been as great as a cholera season. He enumerated a number of examples of the methods by which smoke might be diminished in private houses. Private houses were the worse sources of smoke in towns and they affected not only the purity of air, but the amount of light. He proposed that some resolution be carried which could be laid before Parliament.

Dr. Tripe (Hackney) agreed with Mr. Hart. In Hackney, as soon as the fogs set in the mortality increased. The effect of fog was to kill those who were susceptible. Many asthmatics were benefited by breathing hydrocarbons.

Dr. Edward Houghton, of Upper Norwood, thought that there was urgent need of legislation in relation to smoke abatement. He considered that a small house-tax might be imposed upon those who neglected to use grates which were of a proper construction. The public should see that their representatives in Parliament brought the matter forward.

Professor F. W. Oliver drew attention to the nature and extent of the injuries caused by fog to vegetation, and gave some account of his experiments on this subject carried out under the auspices of the Scientific Committee of the Royal Horticultural Society. He alluded in some detail to the action of sulphurous acid on vegetable protoplasm. In conclusion, he referred to the work of the Manchester Committee, and expressed the conviction that similar systematic records should be kept of the varying constitution of the London atmosphere.

Mr. Pridgin Teale, speaking of domestic smoke as the result of imperfect combustion, said that this could be in a great measure reduced by adopting in our fireplaces principles of construction now well understood, but violated in a great proportion of the grates produced by makers. Coal must be burned in as hot a bed as possible, viz., firebrick, and the air should be admitted on to the surface of the coal, not through it, coal being burned in so large a mass as is consistent with the size of the room to be warmed.

Professor Lehmann (Wurtzburg) said the Germans suffer as we do, but using close stoves it is less objectionable.

Sir H. Roscoe proposed the following resolution, which was seconded by Mr. Ernest Hart.

"That this section of chemistry and physics in relation to hygiene, requests the President of the Local Government Board and the Home Secretary to take into consideration whether legislative measures cannot be introduced to lessen the amount of smoke produced from dwelling houses in towns, and thus diminish the density and mitigate the evil effects of town fogs."

Mr. Hargreaves Raffles thought that statistics should be collected.

Mr. A. Fletcher followed with a paper on

"The Means at our Disposal for Preventing the Emission of Smoke from Factories and from Dwelling Houses."

Reference is made to the antiquity and persistence of the complaints against black coal smoke. Action was taken to suppress smoke by Royal edict in 1386. A Parliamentary inquiry was held in 1829 and in 1843. Legislation followed in 1853, in 1856, and 1875. The effect of these Acts on the smoke of London has been greatly to diminish the amount emitted from factory chimneys and steamboats on the river. The Metropolitan Smoke Acts are administered by the police, while the smoke clauses of the Public Health Act are in the hands of the local sanitary authorities. Black smoke is the result of imperfect combustion. The conditions to be observed in order to prevent it are: (1) The admission to the furnace of sufficient air; (2) the mixture of that air with the combustible gases; (3) the ignition of the mixture by exposure to sufficient heat. The difficulty of observing these conditions in a hand-fed furnace is shown. Various mechanical appliances are referred to. Gas firing. Analyses were given of fuel gases taken from furnaces where various descriptions of coal were consumed. The smoke of domestic fires. Difficulty of correcting the open fire. The general heating of the air of the house by central stove in the basement recommended, and the use of gas as a fuel.

The Mayor of Manchester (Alderman John Mark) and Mr. Courtney, of Chelsea, made some observations.

SECTION VI.—ARCHITECTURE IN RELATION TO HYGIENE.

In this section the President, Sir Arthur W. Blomfield, M.A., A.R.A., F.R.I.B.A., read the following address:—

One of the greatest of our English autherities on the subject—the late Mr. Fergusson—in the introduction to his well known handbook, defines architecture to be "The art of ornamental and ornamented construction," and, further on, speaking of the architect, he says, "It would be well if, in most instances, he could delegate the mechanical part of his task to the engineer, and so restrict himself entirely to the artistic arrangement and ornamentation of his design."

If this view of architecture, and the legitimate duties of the architect, were generally accepted as correct, the relation of architecture to hygiene would be reduced at once to something not always easy to trace or grasp, and which has never yet received the full amount of serious and careful attention which it well deserves. In that case most, if not all, of the valuable and interesting papers which we are about to hear and discuss would have to be addressed to some other more purely scientific section.

If, on the other hand, we take the more usual definition of architecture as "the art and science of building," its relations to the science of hygiene at once become too varied and too complex to admit of clear and concise description. A vast field is at once opened out before us, in which it is often extremely hard, sometimes even impossible, to indicate with precision the line of demarcation between the domain of the architect and those of experts in other branches of science. As one out of many illustrations which might be cited of this difficulty, I may mention the wide and interesting subject of paving, which plays so important a part in the health, comfort, and well-being of communities.

This large question seems to occupy a kind of neutral ground between the province of the architect and that of the civil engineer.

Directly scientific considerations are admitted side by side with the purely æsthetic aspect of architecture, it becomes hard to name a subject for discussion at a Congress of Hygiene which would not be as suitable for an engineering, medical, or other scientific section as it is for that of architecture.

For this reason I venture to throw out the suggestion that for some future meeting of this Congress an extremely interesting and instructive paper might be written dealing exclusively with the points of contact between hygiene and the purely æsthetic side of architecture.

This branch of a great subject remains up to the present time practically almost untouched, perhaps, partly from the fact that to many minds the attempt to establish any such relationship appears fanciful and unpractical. It is well known that one of the greatest of our English pioneers of sanitary science, the late Sir Edwin Chadwick, viewed the idea of any such connection with disfavour, and even with anger; he seemed, indeed, to think that art and hygiene were not only unconnected, but even in some respects incompatible.

Notwithstanding this decided opinion of a great and deservedly respected authority, I do not think it would be difficult to show that such a connexion has, at any rate, for certain minds and constitutions, a very real existence; neither would it be hard to prove that, although never, perhaps, closely followed up or fully worked out in all its bearings, the idea of some actual relation between beautiful and artistic surroundings and health, must have been present in the minds of many writers, both ancient and modern. Time forbids me to do more than instance a very few examples.

I cannot refrain from giving one of great weight and venerable antiquity which I find in the third book of Plato's "Republic."

"Let our artists," he says, "be those who are gifted to discern the true nature of beauty and grace; then will our youth dwell in the land of health, amid fair sights and sounds; and beauty, the effluence of fair words, will visit the eye and the ear like a healthful breeze from a purer region, and insensibly draw the soul, even in childhood, into harmony with the beauty of reason."

Thus, it would appear the great philosopher held that the finest productions of art, acting through the eye on the mind, exercise a distinct influence on bodily health; and if, as Emerson tells us, "Out of Plato come all things that are still written and debated among men of thought." We may take this passage as a type of many similar thoughts scattered through the works of numberless authors from his day down to the present time. May not the same idea be traced in the much-quoted line of our own poet Keats, "A thing of beauty is a joy for ever"?

At present, no doubt, large masses of people are still so habituated to these last characteristics in their every day surroundings that they scarcely feel a wish for anything better, just as they will get accustomed to evil smells, and a vitiated atmosphere which they breathe, quite unconscious of its insidious and deadly effects on their health.

But if education and culture continue to advance as they have done in the last fifty years, and habits of intelligent observation are fostered and encouraged, the eyes of the masses will every day become more sensitive and fastidious; the dreary and monotonous streets, and badly designed buildings which a few years ago would have been passed unnoticed, will soon begin to exercise a distinctly depressing and disturbing influence on the mind, which cannot fail to have some ill-effect on the health, comfort, and general well-being of the community.

It is now, I believe, a recognised fact that certain colours, quite apart from the nature of the pigments or dyes which give them, produce very decided effects, both on the mind and body when in certain conditions.

It is probable that the same is true of certain combinations of colours and even of forms in which the skill and taste of the artist must be paramount, and in which the aid of science, however necessary, can only be looked upon as subsidiary.

Valuable hints and suggestions bearing on this subject may be gathered from a lecture delivered many years ago at the Royal Institution by Cardinal Wiseman, entitled "Points of contact between Science and Art." Also from an address delivered by Mr. Wyke Bayliss, President of the Royal Society of British Artists, "On Sanitary Reform in relation to the Fine Arts," at the Sanitary Congress held at Hastings in 1889.

As might naturally be expected from such a source, it teems with beautiful and poetical thoughts bearing on the subject. He shows how ruinous are dirt and disorder to the best interests of art, and how all artists must hail every onward step in sanitary reform as not only conducive to bodily health, but to the growth and progress of art. The whole cannot fail to be read with as much pleasure as profit, and anyone who desires to follow out the line of thought I have suggested in tracing a direct connection between architecture as a fine art, and hygiene, will do well to study this address with great care and attention. But the illustrations, arguments, and advice made use of are directed more to the influence of sanitary reform on the growth and development of art than on the effect of art on health, a more obscure, perhaps, but no less interesting subject, and the one I desire to see dealt with.

I have left until the last all mention of the only writer who, as far as I know, has ever made any serious attempt to deal systematically and in detail with this interesting subject.

Some years ago my friend Dr. B. W. Richardson, who stands in the foremost ranks of sanitary authorities, delivered a lecture upon it, which, I am afraid, is now out of print, and I have been unable to obtain a copy; but he has kindly furnished me with some information about it.

He tells me that the principal points he dwelt on were as follows:—

He began by showing that much prejudice had been excited against some of the best sanitary inventions and labours, because leading sanitarians have failed to consider artistic construction as part of sanitary construction; their whole minds have been absorbed in the useful, and they have permitted all that is ornamental to pass by as if good taste were disconnected from sanitation. He argued that this was a grand mistake; that ugliness was an offence to good health, and that beauty was an aid to the best health.

He showed that when mind and body are enfeebled by bad health, the introduction of disagreeable objects into the sick room or ward is painful and injurious to the occupants; whilst the presence of beautiful flowers, pictures, and designs is curative in its effects; a kind of mental tonic which gives tone also to the body. This thought led him to the consideration of the best forms for hospital wards having regard to the effect on the eye, and through the eye on mental and bodily health, and so with all the details of visible construction and of decoration.

Speaking of the dwelling-house, he maintained that no part ought to be excluded from the possession of architectural art, because it is the tendency of the human mind to let that which is disagreeable, plain, and ugly, go without regard and accumulate dirt and disorder. Hence all the offices of a house should have as much care bestowed on them as the living rooms to render them bright and cheerful, and to make cleanliness as obvious a necessity in one as the other. In this lecture Dr. Richardson made a great point of the treatment of floors, adverting particularly to the ancient Roman mosaic floors, which were not only beautiful works of art, but easily cleaned, and by the well-known hypocaust system of warming diffused an equable and agreeable warmth through the room without draughts.

Other points especially dwelt upon were the treatment of roofs and the introduction of artistic water fountains in different parts of the house.

No one could be found better qualified than Dr. Richardson to speak with authority on both the æsthetic and scientific aspects of the question "What is the Relation of Architecture to Hygiene;" but even when writing in the interests of art he is naturally first of all a man of science, and I should like to see the same subject dealt with by an architect from an artist's point of view.

Professor FENEGER (Copenhagen) stated that the architects on the Continent looked in many directions for instruction, but not so often to England as to continental countries; but the conviction dawns upon us that in one respect England has taken a prominent part among the nations of Europe since the beginning of this century—viz., in sanitary house building, also in the construction of separate wards in hospitals. Now, we cannot even build a stable on the Continent without being indebted for ideas to England. He concluded by proposing a vote of thanks to the President for the honour conferred upon the meeting by his presence in the chair, as well as for his admirable address.

M. CHARLES LUCAS, of Paris, seconded the vote of thanks to the President, and entirely concurred in the necessity and the desirability for beauty and art being associated in all matters of architecture.

The PRESIDENT having returned thanks, the following paper was read by the Earl of MEATH on:—

OPEN SPACES.

Granted that fresh air and open spaces is needed for the health of the inhabitants of our larger towns, we will briefly consider the two ways of satisfying this need, namely:—

1st. A systematic acquisition and preservation of land for public recreation, in connection with the towns and in relation to their growth.

2nd. Increased facilities for taking people from the towns into the country.

In the towns themselves the governing bodies—the councils—should lay down and should carry out some such rule as the following:—

> That public recreation grounds should be provided in each parish, in proportion to the number of its inhabitants

This would mean that there should be a fixed minimum of open space for a limited number of the population. Here and there the minimum would be exceeded, and so much the better for the people, but it should always be reached, either by securing existing open spaces for the people for ever, or by acquiring new ones, and this, if need be, by pulling down houses for the purpose. And for the information of those who are not well acquainted with the question of acquiring open spaces, I would mention that much may be done in the towns by securing and throwing open enclosed and deserted squares, disused graveyards, the remnants of village greens (where such have become merged into the towns), vacant plots of railway land, abandoned wharves, market-places, etc., etc. The Open Spaces Act of 1877, amended in 1881, 1887, and 1890, the Disused Burial Grounds Act of 1884, with its amendments, and other measures, give all the power that is needed to local bodies to carry out these improvements. The Metropolitan Public Gardens Association, which has been at work in London since the close of the year 1882, has laid out, or assisted to lay out, 65 gardens and playgrounds for the use of the public; has given grants of seats for 31 other sites, either streets or open spaces; has granted money towards the formation and maintenance of 23 public gymnasia; has secured the opening of 166 playgrounds belonging to the London School Board (on Saturdays); and the laying out and throwing open of 19 recreation grounds; has planted trees, and given grants for tree-planting in 37 thoroughfares and other sites; has opposed encroachments on 18 disused burial grounds, commons, and open spaces; and has in other ways assisted in the preservation and formation of very many useful recreation grounds. What has been done in London (and it is very little compared to what needs doing) can be done in the other large towns; there is the same opportunity for improving them by bringing green grass, bright flowers, and shady trees into the dingy and monotonous streets.

London and the large towns will increase, and the only question to be settled is—Are they to increase from outside inwards, or from inside outwards? Two diagrams will illustrate, in a rough manner, what I mean. The size of the central circles (denoting the towns) is the same. The size of each excrescence, and their number (denoting the suburbs), is the same. The amount of open space enclosed in each dotted circle is also the same, but its distribution is different.

Diagram 1 showed the largest mass of new houses next to the old centre, whereas the smallest group of new houses adjoined the largest plot of open space. In diagram 2, on the contrary, a larger area of open space is brought close to the old mass of buildings, and the greatest number of new buildings are nearest to the open country. There are, perhaps, advantages in either system; but the advantages in the second, from a healthful point of view, if not from an artistic one, outbalance, in my opinion, those of the first. It may be said, however, that the plans are too fanciful to be of any use; that suburbs always grow in accordance with local need and local possibilities; and that a town built in a pattern, and only allowed to grow in a pattern, would be impossible and undesirable. But I am speaking theoretically, and I wish my theory to be illustrated in a purely systematic way. Diag. 2, if carried out, would involve a cessation of building immediately adjoining the original centre, and this is what is most needed. In other words, a town that has reached a certain size should grow no more, except from centres at a given distance outside. I am not speaking of a plan suitable for time and eternity, or to be carried out by generations far ahead of our own. They will need other and much more far-reaching reforms in building, if the population continues steadily to increase. I am speaking of something that is needed at the present time, and of a plan that might now be adopted in several of the larger towns in England. To take the metropolis as an example: It is not so likely to hurt London that Wimbledon or Tottenham should grow to great proportions; what does hurt London is, that all the fields of Fulham and Deptford are being covered with houses. It is the increase from the centre that is so detrimental—the gradual annihilation of the remaining open space which is close to, or forms part of, the towns.

In the towns themselves there should be every effort made to have beautiful streets, with trees and seats in them, and beds of flowers, instead of neglected and dirty corners, and creepers planted on bare walls. Every disused graveyard and deserted enclosure should become a bright garden, and every plot of unused land be made into a children's playground or an outdoor café.

If the preservation of open spaces were properly taken in hand and systematically carried out, there would not be so much need as there is now for increasing the facilities for taking people from the towns into the country. But still it will always be of great advantage, both to young and old, to see new places and breathe different air; to visit the seaside and the rural country. The railway companies have done much of late years to render this possible to a greater number by issuing cheap "fortnightly" tickets for the seaside, etc., etc., and there is more than one useful society at work giving country holidays to city children, and sending the tired seamstress and overworked clerk to breathe the sea air, besides numberless private people who are doing their best to supply this need by throwing open their own country houses, or paying for the holidays of those who are less blest than they are with this world's goods. This is a question which is not so easily dealt with officially; it is one which, although very important, must be left more or less to be settled by the railway companies and by the people themselves. Something may be done to teach the inhabitants of the towns how best to make use of their holidays, especially the bank holidays. But, after all, they will please themselves, and some will go to Epping Forest, while others will sit in the nearest tavern and drink, and drink, and drink; and, amongst those who are in Epping Forest, there will be some who feast their eyes on the beautiful trees and tender grass, while others will care for little beyond the ginger beer and the sticky sweets.

Mr. WILLIAM WHITE said that he did not quite agree with the writer of the paper that the poorer class of persons should be kept in a locality entirely by themselves, but he thought that they would become elevated from their present condition by being brought into more immediate contact with better surroundings.

The Earl of MEATH said that it was not at all the intention of the writer of the paper to convey the idea that the poorer classes should be entirely isolated from the better classes; and with reference to open spaces in the metropolis, he was of opinion that it would be of great benefit to have such spaces connected by park-like thoroughfares or boulevards, as in Chicago.

Mr. ROGERS FIELD, M.Inst.C.E., coincided with the Earl of Meath's remark as to open spaces in the metropolis being connected by boulevards, and stated that in 1851 plans were prepared for a thoroughfare of this description to be formed between Primrose Hill and Hampstead Heath, but owing to the Crimean War, which broke out at that time, the scheme was not proceeded with. This is a single instance, and he could not help thinking that there must be other similar places around London where such a scheme might be put in practice.

Mr. H. H. COLLINS said that he felt quite sure the only way in which more open spaces could be acquired in the metropolis was by impressing upon the owners of the land that it is not only for the good of the persons residing upon their estates, but for their own benefit that such action should be taken by them as shall secure the requisite amount of open space for the buildings on their land. He was sure that the population was already too overtaxed to lay any additional burden upon them in this respect. He stated no suggestion could be adopted as to compelling the land to be sold. He knew that even now, when applications are made to local authorities to supply them with trees to plant in the thoroughfares, such offers are frequently declined on account of the expense entailed in maintaining them in proper condition.

Dr. SYKES advocated power being given to the local authority to compel landlords or landowners to build only a certain number of houses on a certain space of ground, and that a great deal of the insanitary condition of houses was caused by builders being allowed to go eight or nine feet underground. He also alluded to the great debt which the present generation owed to their forefathers for burying their dead in the centre of the metropolis, so that these disused burying places might be turned into pleasure grounds, though this was doubtless done in ignorance.

Dr. ELGIN GOULD said that the paper read by the Earl of Meath appeared to recommend small open spaces rather than large. If the large spaces were taken out of certain of the great cities, the result would be in favour of London as to smallness of population compared to area. With Hyde Park taken out, London had 909 of population per acre; Philadelphia, a State of over a million of inhabitants, counting all its open spaces at 340 to the acre, but if one large park were taken out, the population would be 17,549 per acre. Vienna, 473 per acre, when all spaces were taken into account, counted 3,300 per acre when taking out its largest park.

Dr. GLADSTONE was of opinion that the poorer classes should not be in immediate proximity to the better class localities in a town.

Mr. SLATER stated that London was at a disadvantage compared to continental cities, owing to its immense size with respect to obtaining open spaces around it. The fact is that London had grown so rapidly that the want of open spaces could not be foreseen. Many of the larger cities on the Continent have originally been fortified cities, and these fortifications have been turned into open spaces. There should be a restriction made as to the height to which buildings were carried in narrow thoroughfares. It is only quite recently that an Act has been passed to enable the London County Council to restrict the height of the building in respect to the width of the street in which it is erected.

Mr. ROGERS FIELD stated that with regard to bye-laws for the regulation of drainage, he was engaged some ten years ago in drawing up a set for the town of Uppingham for adoption by the Local Board of that town. The chief argument against the bye-law was that although they could be enforced with reference to new buildings, they could not compel the old buildings to be drained in accordance therewith. But he contended that when the public knew that certain things were right they would endeavour to conform to them, and would not offer resistance to bye-laws established by the authority of the district, although they might not be capable of being strictly enforced.

Mr. COLLINS alluded to the barrack-like buildings which were erected as dwellings for the artisan and labouring classes as unsuitable for the purpose for which they were built, and advocated the building of cottage residences as more sanitary than these buildings, where a large number of persons were crowded into a small area.

Mr. W WHITE said that the question of dwellings for the poor must largely depend upon the value of the land upon which they are built. If by any means the people could be prevented from collecting in such large masses, by so doing the rent of the dwellings of the poor would be lowered.

Mr. STATHAM stated that it was just as bad to crowd people in one building as it is to crowd them in one street. If large blocks of buildings are made use of for the purpose of getting a low rental you must use some of the land in getting the requisite light and air.

Professor AITCHESON, A.R.A., stated that the poorer class of our population were entirely below the class which inhabited the present artisans' dwellings, and that it was absolutely impossible for them to pay the rents demanded in these buildings.

Mr. PAIN, of Liverpool, suggested that the officials who supervise construction of buildings should be appointed jointly by the Local Government Board and the Local Authority in order to ensure their unbiassed and proper exercise of their duties.

Dr. LONGSTAFF thought that it was time a new Act was passed to regulate the building of houses, as, under the Act of 1855, a person building on the site of houses erected before the passing of the Act could build them up exactly under the same conditions as they were previously with regard to height and to air space.

Mr. E. BOND thought that if the suggestion were carried out, great difficulty would be found to exist, and that if back and front spaces were insisted on, large numbers of houses would have to be pulled down.

The Rev. HARRY JONES said he knew of a neighbourhood near the Mint, where numbers of old houses were pulled down and Peabody Dwellings erected on the site; but although the rents of the dwellings were lower than the rents of the old houses, the people displaced did not attempt to inhabit them. They were mostly bricklayers, labourers, hawkers, and bad characters; this he cited as an instance because of the outcry which is generally made respecting poor people being turned out of their homes.

Mr. T. Hall considered that provision should be made in the building bye-laws for excluding ground air by means of vertical ventilation in the walls of buildings. He agreed with Mr. Blashill that all basement floor boards should be laid on concrete. and that the floor boards of the upper rooms should be tongued or lapped so as to prevent air coming through them. The space left under the flooring is simply a harbour for beetles and other abominations.

Dr. Elliott, of Plymouth, thought the proposition of having floorings laid on concrete a valuable one, and stated that it is actually carried out in some towns. He was of opinion that the inspection of houses should be in the hands of the Local Government Board, as he knew that it was difficult for the officer of the local authority to carry out his duties properly on account of persons on the Corporation being owners of property in the district.

Dr. Sykes called attention to an Act passed last year called the Public Health Amendment Act, and in it there was a clause which introduced a new principle into the Buildings Acts—no building which has not been erected for the purpose of a dwelling shall be used as a dwelling until it has been permitted to be so used by the surveyor of the district. and stated that it was the circumstance of buildings being used for other than the purposes they were built for, which gave him so much trouble in his district of St. Pancras, and suggested that an opportunity should be taken of getting a similar clause introduced into a Bill, so as to make it applicable to London.

Mr. E. S. Brydges called attention to the fact that the Act referred to by Dr. Sykes was an adoptive Act, and only adoptive in parts, and that in the part which contained the clause in question several objectionable items occurred, which render the Act useless so far as that portion was concerned.

Mr. Blashill said that he was of opinion that the scheme mentioned in Mr. Burroughs's paper could be practically carried out, and that it would have, if generally adopted, a great beneficial effect upon the public health, as it would render the air purer by lessening the smoke from fires and obviate fogs.

Mr. Burroughs, in reply to the question, said that the steam pipes would be from eight to nine inches outside the houses, but much smaller within the premises. He had not heard of any difficulty occurring through subsidence of ground, but of course such an occurrence might take place as in the case of gas and water pipes. The system is being greatly used in the United States with great sanitary improvement in the state of the towns. It is customary in using the system to place steam traps at intervals, which would prevent accidents occurring through the water being forced onwards by pressure of steam.

SECTION VII.—ENGINEERING IN RELATION TO HYGIENE.

The business of this section commenced at half-past ten o'clock, and there was a large attendance. The opening address was read by the president, Sir John Coode, K.C.M.G.

It is my first duty, and I esteem it at the same time to be my great privilege, to offer, as I now do, on behalf of the English members of the Engineering Section, a cordial welcome to those brethren of our profession who have come among us from afar in order to be present at this Seventh International Congress of Hygiene and Demography.

It has been, I can assure you, the anxious desire of the Organising Committee to provide such papers as will contribute to the advancement of the knowledge of hygiene in all its branches.

Of both the scope and the importance of the subject with which the Congress has taken upon itself to deal, there cannot surely be two opinions. Having for its principal—or rather it may be said for its sole—aim and object the preservation of health (or, in other words, the prevention rather than the cure of disease) the subject of hygiene may well occupy the attention, and claim the interest, of all who desire the welfare of the human race.

As we, the British members, are well assured, it is because the object of this gathering is one which is in an especial degree calculated to benefit the community at large, that it enjoys the patronage of our honoured and beloved Sovereign Queen Victoria, and that it is supported by the presidency of the Prince of Wales; by his presence at our opening meeting yesterday His Royal Highness has given indubitable proof that he feels a genuine interest in the success of the cause which we all have at heart.

It will not, it is to be hoped, be devoid of interest, if I here offer a few remarks on the progress of modern legislation in this country in respect of sanitary matters.

About the year 1838 the public mind of Great Britain became first aroused, so to speak, to the serious and growing evils arising from the absence of proper precautions for the preservation of the health of the dwellers in our large towns and cities generally, and more especially in this metropolis in which we are now assembled.

Between 1838 and 1848, the question of Public Health in the United Kingdom was dealt with in the course of frequent debates and discussions in Parliament; it also formed the subject of inquiries by Committees and Commissions. At the end of that decade these investigations and discussions culminated in the establishment of an entirely new department, which was entitled the "General Board of Health"; a few years later on that body was superseded by an Act of the Legislature, under which the important Department the "Local Government Board" was created.

Many names might be mentioned in connexion with the work of the two decades just adverted to, but amongst them there stands out most prominently that of one man, the late Sir Edwin Chadwick, whose untiring zeal and well-directed labours contributed more than those of any other single individual to the success of this great movement, and to the adoption of those important measures which have conduced in so great a degree to the improvement of public health in this country.

When speaking to a body of civil engineers, as I have now the honour of doing, it would be remiss to omit to mention the name of another gentleman, whom we have the privilege of including in our list of vice-presidents; I refer, of course, to Sir Robert Rawlinson; his eminent services, first in the organisation, and, secondly, in the direction for many years, of the Engineering Department of the Local Government Board, have deservedly received the marked approval of the Sovereign.

The importance of a correct knowledge of the laws of hygiene being granted, this importance becomes accentuated in every place where human beings are congregated together in considerable numbers, as in the case of large towns and cities, the greatest and most notable example of which is this mighty metropolis, this "City of immensity," as it has well been called.

Is there not therefore a peculiar fitness in the holding of this Hygienic Congress in London, which contains the greatest congregation of human beings the world has even seen.

Permit me to mention a fact or two which may serve to give some of those whom I now address a more exact idea of the magnitude of this London of ours.

The population of the metropolis is, in round figures, 5 670.000, a number which is well-nigh appalling to those who can form an adequate conception of its magnitude, its vastness will perhaps be somewhat better realized by my stating the fact that it is considerably greater than the numbers of the inhabitants of the cities of Paris, of Berlin, of Vienna, and of Rome all combined.

As a matter which cannot fail to be of special interest to engineers, let us turn for a moment and see what has been done in the way of works that have been executed for the special purpose of improving the health of London.

The main intercepting and principal branch sewers which have been constructed for the conveyance of the sewage of London to the two outfalls into the River Thames, at Barking and Crossness respectively, measure about 80 English miles, equal to 130 kilometres.

Since the year 1856, when the now extinct "Metropolitan Board of Works" was formed, there has been expended on the main drainage works alone the sum of nearly £6,000,000 [120,000,000 marks or 150,000,000 francs].

As a by no means unimportant factor among the changes which, in modern times, have resulted in the better health of our capital city, a reference to the supply of water of improved quality, and in larger quantity must not be altogether omitted. Up to the end of 1890 the several companies (eight in number) had expended upon works for the supply of water to London, a sum very closely approximating to £15,000,000 [300,000,000 marks or 375,000,000 francs]

The average quantity of water delivered last year to the inhabitants of London, for domestic purposes alone, was 24.75 gallons per head of population per diem, and in respect of quality but little, if at all, surpassed by that supplied to any other city in Europe; this water is conveyed through pipes, the united length of which is about 4,760 miles.

The total volume of water delivered for domestic purposes only in 1890 was 64,000,000,000 gallons [290 623,000 cubic metres]. For raising this large quantity the companies employed no less than 184 steam pumping engines, having an aggregate of 21,659 horse-power.

As another illustration of the magnitude of London it may be mentioned that the streets and roads within the metropolis, if placed end to end in one continuous line, would measure about 2,500 miles, equal to the distance from London to Land's End, and thence across the Atlantic Ocean to the mouth of the Gulf of St. Lawrence to Canada on the west, or, going eastward, would extend across the entire Continent of Europe, and beyond the Ural Mountains into Asia.

Whilst admitting that great benefits have accrued from the extensive drainage works which have been executed, and the large expenditure that has been incurred for improving the health of London, it cannot yet, by any means, be said that all has been accomplished which might be done in this direction. Nor will it be possible to say as much so long as the sewage of the metropolis is allowed to flow into any part of the Thames without previous purification by the most perfect method as yet known, *i.e.*, by being filtered through land. The only alternative would seem to be the conveyance of the sewage to the sea coast beyond the mouth of the estuary of the Thames.

Nevertheless, and notwithstanding the room which exists for the further improvement in the disposal of its sewage, the reduction which has been brought about in the death-rate of London in modern times is as noteworthy as it is satisfactory. A few facts will show the benefits that have arisen from the better understanding, and the more effectual application, of the laws of hygiene in our metropolis.

In the latter half of the seventeenth century the average mortality of London is said to have been not less than 80 per 1,000; at the end of the eighteenth century it had dropped to 50 per 1,000; in the decade ending in 1850 it was 25 per 1,000; in that ending in 1870 it was 24 per 1,000; whilst in that ending in 1890 it had further fallen to 19·8 per 1,000.

It is gratifying to note that for the year 1889, taken *per se*, the rate was as low as 17·4 per 1,000, and there is no reason for supposing that it would not have been equally low for the year 1890, had it not been for the unfortunate epidemic which then prevailed, in consequence of which it rose in 1890 to the same proportion as that at which it stood in the early part of the last decade, viz., 20·3 per 1,000.

In the opening part of this address it was stated that it had been the anxious desire of the Organising Committee to provide on this occasion such papers as would contribute to a further knowledge of the subject of hygiene; I will now only add, in conclusion, that as far as regards our own particular section, we, speaking on behalf the Engineering Committee, have, in this respect, endeavoured to fulfil our part, and have also made arrangements for your inspection of works of professional interest from a hygienic point of view.

We trust that the papers to be read and discussed, and the visits which have been organised, will prove to be not altogether uninstructive, and that they will result, in some degree at least, in furthering the aim and object of this International Congress, *i.e.*, the advancement and diffusion of sound and useful knowledge relating to the all-important subject of sanitary science.

The first paper was read by Professor Henry Robinson, M.Inst.C.E., F.G.S., F.R.M.I., on "The Sewage Disposal in Relation to Water Supply and River Pollution." Professor Robinson called attention to the fact that centres of population which are in proximity to rivers regard them as the natural means of conveying from their midst every kind of fluid refuse, both manufacturing and domestic. Experience has proved the unwisdom of this. He then discussed the main points which require to be observed in the collection and removal of sewage on the water carried systems, both from an engineering and a sanitary point of view. The methods of clarifying and purifying sewage were next dealt with. The bearing that the discharge of untreated sewage and the foul effluents from treated sewage into rivers has upon the question of utilising such rivers for domestic purposes was touched upon. The necessity for placing rivers under continuous chemical and engineering observation is strongly recommended. Professor Robinson then alluded to some recent observations of Professor Von Pettenkofer upon the discharge of the sewage of Munich into the River Isar.

"TOWN DRAINAGE IN ITALY."

By Professor PACCHIOTTI.

Attention was first called to the remarkable progress that Italy has made during the last ten years in hygiene. England, however, was the first nation in the world which opened the way to all the world for great sanitary reform. Italy was now following in her footsteps by making active sanitary improvements; examples were furnished by various towns and cities, particularly by Turin, with a special description of the latter town. The relative advantages of the "separate system" of drainages, and of that advocated under the title of "le tout à l'égout," were discussed.

Professor PACCHIOTTI then submitted the following points to the Congress: 1. Every town must select that form of sewage disposal which is best adapted to its own circumstances. 2. The tout a l'égout system most clearly approaches perfection, and should be adopted by all towns which have a good water supply and approved gradients. 6. Towns possessing suitable soil in or near a town, should establish sewage farms. 4. Unless absolutely avoidable, sewage must never be allowed to flow into water-courses.

"SANITATION IN INDIA."

By BALDWIN LATHAM, Mem. Inst. C.E.

There is no country that requires greater attention to be paid to sanitary measures than India, and there is, probably, no country which will repay the labours of the sanitarian better than India, as is already shown by the results accruing from the prosecution of sanitary works and the adoption of sanitary measures which have, wherever introduced, been immediately followed by a marked improvement in the state of public health.

The supply of wholesome water, the construction of sewerage and drainage works, and an effectual and safe method of dealing with the waste products of the vast populations are matters of urgent necessity throughout India. The general habits of the majority of the native population are such as to lead to the pollution of the air, the ground, and all unprotected sources of water supply.

The dense population living in Indian cities is a condition that points to the urgent necessity of efficient sanitary measures being adopted. There is no wonder that the death-rates in Indian cities are large, as the average density of population may be taken as 100 persons per acre, and in many parts of the cities there is a still greater congestion of the population.

Under existing arrangements the ground of all Indian cities is more or less impregnated with filth and the urinary excretions of man and beast, and so great is this pollution that in most cities local wells have become brackish as a result of ground pollution. Nor is this state of things confined to the cities, for in the villages there is just as great neglect of sanitary requirements, and the cattle often occupy the lower rooms of the habitation, thus adding to the unhealthiness of the dwelling and the pollution of the ground.

The inhabitants of the cities, towns, and villages in India die of diseases arising from insanitary conditions at a rate of which we have no conception in this country. There are also other causes of death in India (some of which are common to other countries) that influence the death-rate, such as exposure and insufficient clothing during the wet and cold seasons. The natives of some parts of India are also subject to causes of deaths unknown in European countries, such as death from snake-bite, and being killed by wild beasts, but deaths from these causes may be excluded, as they are less than half per cent. of the total deaths in the district most subject to this form of mortality.

The climatic conditions of India cannot be considered absolutely unfavourable to the promotion of good health. The high temperature of the plains of India, having regard to the polluted state of the ground and of the water supplies, is a condition certainly not favourable to the health of its inhabitants. On the other hand, probably, if it were not for the influence of the sun in drying up and destroying much of the polluting matter, the health of the inhabitants of India might be much worse. The most unhealthy periods in India are certainly not the hottest periods of the year. The high temperature of the ground is unfavourable to health in all those places in which the refuse from the population is stored in receptacles below the ground level. The favourable health statistics of large towns like Bombay and Calcutta shows that it is not climate that causes the frightful mortality in many parts of India, but is due to the downright neglect of the simplest sanitary precautions.

The fixed wet and dry seasons of most parts of India can be depended upon with a degree of certainty. The excessive rainfalls of one period, compared with the long absence of rainfall in other periods, tend to show that the separate system of sewerage is one which is the most proper for certain places in India, and that the rainfall in these districts should, as far as possible, be completely segregated from the sewage proper. The rainfalls in some of the larger cities are excessive, for in Bombay falls exceeding four inches per hour have been recorded, while in a single day over sixteen inches of rain have fallen. The average of the heavy falls of rain in Bombay exceed two inches per hour, whilst the average of the daily heavy falls exceed seven inches per day. In Calcutta the rains are not so heavy as in Bombay, but occasionally heavy falls exceeding the rate of three inches per hour have been recorded, but on an average rainfalls exceeding five inches per day are only recorded once in three years.

The sanitary appliances in use in India are of an extremely varied character. In many cases conservancy is unknown, and the refuse of the population rots at each man's door. In the cities, for the most part, the Halalcore system is adopted, a system by which the solid nightsoil is collected in a basket placed below the closet seat, an arrangement which allows the liquid parts, including the water of ablution, to flow away usually to the street gutters. Under this system the stercoraceous matters are collected by men and women every day and then carried in baskets on their heads to some central point where they are deposited in a barrel on wheels and are then carted to some place for disposal. In the cities where they have sewers these matters are mixed with water and flushed into the sewers; where they have not sewers the matters are either trenched or buried in the ground or manufactured into poudrette.

The trenching of nightsoil cannot go on in the time of the monsoon, and at this period the material is generally buried in deep pits and sometimes resuscitated and manufactured into poudrette. As a rule, the effect of burying this matter in deep pits in the hot soil of India causes a violent fermentation to take place, and an indescribable nuisance to be created. The trenching grounds, too, are extremely obnoxious, and the position of these trenching grounds is ordinarily fixed as a matter of convenience, and often pollutes the underground water, the soil, and the atmosphere of the neighbourhood of a town to a most injurious extent. At Poonah an attempt has been made to manufacture the material into poudrette by admixture with wood ashes and drying in the sun, and under sheds in the monsoon, and it is found that a manure very valuable for some crops can be produced, but that the sale of the manufactured article does not return more than one half of the cost of its collection and manufacture.

In most cities privies are of common occurrence, and the author has seen a structure of this kind in Calcutta, in which the excreta drops into the basement of the many storied buildings of considerable altitude, where it accumulates to a considerable depth, and from whence it is removed in semi-liquid condition by the Sanitary Department. Cesspools constructed in brick, stone, and other materials are in common use, and large earthenware jars sunk into the ground are also used as cesspools, and are emptied at periods more or less remote. The surface of the street in most cities is the receptacle for a large part of the sewage of every city.

In the Holy City of Benares they have had a system of covered sewers in operation for a long period, but these sewers are more or less imperfect in form, but, bad as they are, Benares is in a much better state of health and has had a lower death-rate than many of the towns that do not possess any such system, and this in face of the fact that Benares is the home of large numbers of persons who go there especially to die, and is a very crowded city, is a matter that speaks well for the advantages of works sewerage.

Earth closets also have been used in India, but it is found that owing to the large amount of earth required their use among natives is not general, as the waters used for ablution necessitate about 5 lbs. weight of earth being used to each inhabitant per day.

With the exception of some of the large cities, the water supplies are extremely defective. The supplies are usually taken from tanks, which are, for the most part, nothing but filthy polluted ponds, into which generally the drainage of the village or town has direct access. The tanks in use in the suburbs of Calcutta may be taken as a fair description of those ordinarily used throughout India. Analyses of the water of these tanks show that by far the largest portion of them might naturally be classed as containing raw sewage.

As an example of the polluted state of the tanks, and the effects of often filling them in with vegetable and animal refuse, Dr. Simpson, the medical officer of Calcutta, gives a very interesting example in one of his recent annual reports as to the state of these tanks after being partially filled up. A woman residing on the banks of one of these tanks in Shampooker lit a fire for cooking purposes, but after the fuel was consumed the fire continued to burn with a continuous flame, and she was able to cook her food every day for more than a fortnight without being put to the expense of buying fuel. She kept the secret for some days, but at last told her neighbours, who were invited to come and see the wonderful light. Her visitors, however, became so numerous that she made a charge of a pice per head, and by this means, in one day, she realised no less than four rupees. It was a matter of great astonishment, the flame being looked upon by her visitors as the tongue and breath of the devil. The income of the woman was, however, stopped by some of the inquisitive visitors digging up the ground around the house and so allowing the gases of decomposition to escape, after which the fire went out, or only burned fitfully.

The supply of water from wells also is largely in use. The water of all wells within Indian cities must be looked upon with suspicion, as all these supplies are liable to pollution, and in many instances they have become so polluted that they can be no longer classed as fresh water. The wells, also, in a very great measure, are liable to pollution from the mode in which the water is drawn by the utensils of each individual using the water, and also by reason of the site of the well often being for the purpose both of ablution and washing of clothes, and the liability of the polluted waters to return to the well. The running streams of India, to which the natives have access, are polluted from the very sources downwards; but, as a rule, the districts supplied from running streams are healthier than those drawing their water supplies from either tanks or wells.

Cholera, which is more or less prevalent in many parts of India, is almost entirely due to the defilement of wells, tanks, and rivers. The consuming thirst of the cholera patient leads directly to the speedy contamination of all unprotected water supplies. This has been shown in the enormous reduction of cholera in Calcutta by the introduction of the public water supply into that place, and even the recent extension of Calcutta water supply to some of the suburbs of Calcutta has produced an immediate and enormous diminution in the deaths accruing from this very fatal disease.

The experience in India in connection with water supplies taken from rivers shows that the rivers undergo a process of purification, and that the waters taken from them, after a sufficient length of flow and perfectly filtered, are among the most wholesome supplies in the country, as the case of Calcutta fully demonstrates. There is also abundant experience that the introduction of water into a district will not of itself promote good health, especially if the water supply is taken from a place liable to immediate pollution, as, for example, the city of Ahmedabad until the present year has had waterworks, the source of the supply being the Sabarmati River, the intake of the works being actually located within and at the lowest part of the city, below all the points where the river is used for ablution, washing, and other purposes, and is liable to receive the filth of the city washed in with the rains in the monsoon period. Under such a state of things, and in the absence of proper sewerage, Ahmedabad has been very unhealthy, the death-rate of its people having, at times, exceeded 70 per 1,000, and on an average of eleven years—1875 to 1885—has had a death-rate of 53 15 per 1,000. This state of things at Ahmedabad has just been remedied by moving the intake of the waterworks to a point in the river above the city.

In the city of Poona there is also a water supply, but no sewerage, and this city, which is much more healthy than most cities in India, does not enjoy that high standard of health which is secured in cities which have both drainage and water supply. For some time it was a question of doubt in India whether or not, owing to the peculiar religious tenets of some of its inhabitants, if they could use water which had been filtered and supplied through pipes. However, it appears that the Brahmins have announced that filtered water brought through pipes can be used for all purposes except religious ceremonies.

The quantity of water used in the cities of India would be extremely large, under existing arrangements, if the supplies were constant, as generally the native has cleanly habits, and will not bathe in his own house in water in which anyone else has previously bathed, and, as a rule, water is continuously running to waste all the time he is taking a bath. This habit contrasts strangely with the filthy habits of bathing when using the polluted water of tanks or rivers in common with others.

In Calcutta the intermittent water supply of 14 hours per day is over 44 gallons per head per day, and in Bombay it is over 20 gallons per head per day, and it is very questionable if the waterworks which are now being carried out in India will afford a sufficient supply of water for the demands of the population, having regard to the way in which the water is used when once introduced into the city. It is imperative, therefore, in all waterworks, that such water fittings shall be adopted as will prevent the waste of water.

The sanitary appliances for the removal of the refuse of the population by water carriage in India must not only prevent the waste of water, but must be of such a character as not to even splash with water the person using them for fear he is polluted, yet these same natives ordinarily bathe in common, and use waters for all purposes of the vilest character, and to which there has been access of all those matters which are looked upon as a cause of pollution to the particular individual when he has to use sanitary appliances within his own residence.

Such is the sanitary state of India, that it is recorded that in the north-west provinces alone, according to the authority, Dr. Hutchinson, the Sanitary Commissioner, that in 40 out of 106 towns in the year 1889 the deaths exceeded the births. He mentions that the rate of mortality in the small town of Lalitpur, which had a population in 1881 of 10,614 persons, was 81·48 per 1,000, of which 27·32 per 1,000 was due to deaths from cholera.

Small-pox also not infrequently produces a very high death-rate in the districts in which vaccination has been neglected, and in the town of Sandila, containing in 1881 a population of 14,865, the death-rate from small-pox alone, in 1889, was 17·02 per 1,000.

The deaths from fever in India have a different signification than in this country, for in some places nearly the whole of the mortality is ascribed to fever. This is due to the imperfect system of the registration of deaths, as most authorities in India agree that in all probability the actual mortality from fever does not exceed 25 per cent. of the total deaths. The general cause of death, except in the case of cholera and small-pox, is not distinguished by the native collector of statistics, and consequently every disease in which there has been feverish symptoms is usually put down to fever. As an illustration, in Cawnpore, the death-rate from fever is stated to be at 39 92 per 1,000 of the population, whereas the death-rate from all causes stands at 49 60. The city of Cawnpore, in the year ending March, 1890, had a death-rate of 53·11 and a birth-rate of 40·46. It should be noted that in India very many deaths are not recorded, so that the death-rates in all cases may be taken as being higher than is actually given by the figures.

As a rule, the towns in India are very much more unhealthy than the district in which they are located. In the North-West Provinces the average death-rates of all the towns exceeded, on an average, during the past five years, that of the districts in which they are located by 5·13 per 1,000. It is also found that women who are more exposed to the unsanitary conditions of home life, suffer more than the males. Dr. Simpson's returns for Calcutta show that the deaths of males for four years, from 1886 to 1889, was 23·4 per 1,000, whilst it is found that the deaths of females in the same time was 31·4, or the female rate of mortality was 36·5 greater than that of the males. It should also be noted specially with regard to the position which females occupy in India, that the suicides amongst females is three to one to the males, or exactly in the reverse proportion to that of England. This is, in a great measure, attributed to the restraint put upon females.

As a result of sanitary work in the case of the city of Calcutta, we have the means of comparing the health of that city, which receives a good supply of wholesome water, and has been sewered, with the suburbs, which have received neither of these advantages. From Dr. Simpson's return for the twelve years 1877-1888 it is found that the average death-rate of the city of Calcutta was 28·7 per 1,000. In the same twelve years the average death-rate in the suburbs of Calcutta was 47·25 per 1,000. The population was almost twice as numerous in Calcutta as in the outside district, yet the outside district had an average death-rate exceeding that of the city itself of 64·63 per cent. These figures at once show the incalculable advantage to any place adopting sanitary measures, for it cannot be said that in Calcutta the sanitary works, as regards its system of sewerage, are by any means perfect, and nearly the whole of the benefits which have accrued in the case of Calcutta have been shown to be due to the introduction of a wholesome supply of water, and this may again be inferred from the fact that in the suburbs of Calcutta that have been supplied with wholesome water and have no sewerage works, the death-rates have immediately been reduced. Moreover, it was found that when Calcutta was first supplied with water in 1876, before its sewerage works were carried out, the average death-rate for five years, before the supply was introduced, was 38·2 per 1,000, while the average death-rate for the subsequent five years was 24·6 per 1,000, or a reduction in the death-rate of 35·6 per 1,000. The authorities in India usually calculate that for every death recorded there are at least 20 cases of sickness. In all probability the number may stand much higher, as by reference to the report of the Commissioners at Poona, I find that in the year 1885, out of a population of 100,000 persons, it is recorded that 51,842 were admitted to the hospitals in this city in one year.

Investigations of the sanitary state of India show the urgent necessity there exists for sanitary measures, and it is gratifying to know that the Sanitary Commissioners of India are fully alive to the advantages of such measures, and, aided as they are by the supreme authority and the Governments of the various provinces, it is hoped that in the course of a few years much will be done to mitigate the evils arising from the unsanitary state of the large towns and the country generally.

"French and English Systems of Sewerage."

By James Lemon, M.I.C.E., F.S.I., F.G.S.

The author desires to call the attention of the Congress to the systems in the two countries. In France it is the common practice to discharge the polluted waters from the houses into the channels or gutters of the streets. The excreta and urine from the closets are conveyed by pipes into a closed cesspit, sometimes divided to retain the solid matters and allow the liquid to run into the sewers. In the old quarters tubs are used to hold the excreta, placed in the roofs, in the cellars, and other parts of the houses. These receptacles are a nuisance, and their emptying and conveying through the streets leave pestilential odours behind. These systems are calculated to spread cholera, typhoid fever, etc. The English system in general use is the entire removal of excrementitious matters from the houses before decomposition takes place. The English water-closet is recommended as the cleanest and best receptacle, and in connection therewith the water-carriage systems. Pipes of glazed stoneware are used for small sewers, with manholes at every hundred yards, the sewers being laid in straight lines from manhole to manhole. In the English systems the removal of polluted water from the houses is the first consideration. In the French, the drainage of the streets appears to be the first. The death-rate is a true test of sanitation. In English towns, similarly situated to French towns, the death-rate is much lower, and in some cases less than half.

"The Removal of Sewage after Leaving Buildings."

By Reginald E. Middleton, M.I.C.E.

The increase in the size of towns, and the obligation which exists for the preservation of the natural water supply, and the prevention of pollution of rivers and streams has necessitated the transportation of sewage to much greater distances than was formerly thought requisite.

Increase in the distance of transport has caused increased cost when the sewage and the storm water are mixed, and the increase in cost of this, the most ordinary system of transport has stimulated inquiry as to the possibility as to dealing with the sewage in a more economical manner, and as to the propriety of a system of immense sewers, especially in hot countries, where these must for long seasons in every year become receptacles for filth, which is not removed at all during the dry season, or removed at such a slow speed as to become seriously dangerous to health. Such inquiry has led to the trial of the earth, the pail, the closed cesspit, and the separate system. The advantages the separate system offers appear to be; (1) The use of very small sewers; (2) A fair amount of regularity in the amount of sewage passing through the sewers; (3) The gradients can be arranged to give a minimum rate of flow which shall allow of deposit; (4) Where pumping has to be adopted the amount to be pumped is reduced to a decimal unit; (5) The heavier matters, such as road scrapings, etc., is not passed into the sewers but into the water courses, and the forms should be kept free from deposit with facility; (7) From the small size of the sewers and the comparative regular flow of the sewage in them they offer great facilities for more thorough and regular ventilation than has hitherto been found possible in the larger sewers. Against these advantages must be placed the increased complication of the drainage system, not as a whole, but in the streets; and the fact that as the gradients of drains of small size must be steeper than of those which carry a larger volume, the height through which the sewage has to be pumped, where pumping becomes necessary, will be greater than for large sewers, though the quantity to be dealt with is much less, the proportion can, however, be only decided for each particular case. The separate system appears to offer many advantages for the collection of sewage, in very flat districts, in receivers of limited capacity, placed at comparatively short distances apart, whence it may be discharged or pumped to a higher level by steam power or by water or air pressure supplied from a central station. It is thought that the use of air is most advantageous for this purpose, as very much smaller pipes can be used for its transmission than is possible when water is employed as the motive-power; a speed of sixty feet per second being quite admissible when air is used, while three feet per second would be about the limit for water, and there is no shock with the first-mentioned form of power, while there is considerable shock with the second. The efficiency obtained with the use of compressed air is considerable, and might, it is thought, be greatly increased by its more careful and scientific employment, both as regards the construction of receivers, the height of the lift, in the compressing machinery, by the reduction of waste space, and in heating, and by the expansive use of the air. Where water is used as the motive power, space must be provided in the sewers or watercourses for the exhaust water, while the air may be discharged into the sewer without taking up useful space, and may serve to ventilate it. On the other hand, this air, which has been in intimate contact with sewage matter (presumably, however, little fermented) may be discharged into the streets through some opening, and may become a source of danger. The writer wishes to call particular attention to the necessity which exists for considering each locality on its own merits and conditions, and for providing a system of sewerage which is applicable to those conditions. The same sewers which may do very well in a hilly country are not adapted to one which is flat. A system which is successful in a temperate climate, where the rainfall is moderate and much diffused, is not necessarily adapted to a tropical country, where the heat is great and the rainfall is excessive and concentrated. The separate system is, no doubt, not universally applicable, but the writer believes it to have many advantages which only require consideration to be recognised.

"THE SANITATION OF A MINING SETTLEMENT."

By A. MAULT, Engineer of the Central Board of Health Tasmania.

In the neighbourhood of Mount Zeehan, on the west coast of Tasmania, there occur immense deposits of lead and silver ores. These deposits are attracting a large population. A very graphic description of the insanitary conditions was then described. The first work done was to clear out and straighten down the beds of the two principal rivulets. In consequence of the profuse vegetation the following of definite lines and the making of clean slopes is therefore difficult. The level of the ground water was then lowered two or three feet. With respect to the sewerage the preliminary difficulty was to procure material. Earthenware pipes were out of the question, both on account of cost, and because they would have been broken in transit. The use of wood was discarded for several reasons, and that of rivetted wrought-iron pipes adopted. No good bricks being obtainable, the manholes and catch-pits were made of wood. And as there is no water supply available at present, notices were issued to every householder to construct and maintain an earth closet of certain pattern, and to provide suitable receptacles for the house refuse. This is not a record of engineering difficulties overcome, but a narrative of the exceptional condition of things which is sometimes met with in new communities, and which urgently required to be immediately dealt with.

The discussion on the papers that had been read now took place.

Mr. A. JONES spoke in support of a separate system of sewerage.

Mons. BECKMOWN, Mr. R. READ, Mr. ANDERSON, Mr. THOMPSON (Glasgow), Mr. J. THOMPSON (Edinburgh), Mr. SYMONS, and the PRESIDENT took part in the discussion.

The meeting was then adjourned at one.

The section resumed work at half-past one, when Professor Robinson took the chair. The discussion on the papers read in the morning was continued by Messrs. H. Roechling and Buchan. Mr. A. MAULT then replied, and said it was not the question of cost that induced him to use iron pipes, but because they were more sanitary than wood, and because potting or glazed pipes could not safely be taken without breaking a great number.

Messrs. LATHAM and PACCHIOTTI replied.

Papers were then read by W. SANTO CRIMP, and R. READ.

SECTION VIII.—NAVAL AND MILITARY HYGIENE.

There was an interesting meeting of this section. Want of space compels us to suspend our report.

SECTION IX.—STATE HYGIENE.

After reading some resolutions of the vice-presidents for the conduct of business,

The PRESIDENT (the Right Hon. Lord Basing), in his opening address, dwelt upon the importance of the occasion of the Congress, which constituted, he said, an epoch in the history of nations. Though not a professional man himself, he had followed very closely the building up of the administration of public health in this Kingdom There was no "Code de Napolèon" to start with, it had grown up in a thoroughly English manner, by experience. Thirty or forty years ago the "Municipal Corporations Act" initiated a slight start to sanitary legislation. The cholera was, at its visitation in 1832, a great means of stimulating sanitary legislation, with which the name of Chadwick was at this time eminently connected. In 1847 a second, and in 1854 a third, visitation of cholera was again followed by further legislation, and then Sir John Simon, in a series of valuable reports, consolidated, if he did not form, the science of sanitation. The Royal Sanitary Commission (1870) was really the starting point of all recent legislation. Royal Commissions in this country are very often the means of instituting legislation which is likely to be not particularly popular. As a result of this Commission, sanitary areas were formed, and in 1874 an Act provided for the appointment of medical officers in all districts, and other sanitary improvements. In 1875 his Lordship, being then at the head of the Local Government Board, was enabled to get the Public Health Act of 1875 passed, which was, so to speak, the real code of modern sanitary law. It is to be regretted that it is not until now (1891) that each and all of the provisions of that Statute has been put in force. Turning next to the future, his Lordship dwelt on the excellence in general terms of the hygienic administration of the Local Government Board, and did not advocate any sweeping reform. There were, undoubtedly, certain defects. One of these was the need for revision of sanitary areas. The statistical results of that board's administrations show that in a short period of 20 years the death-rate of the United Kingdom had been reduced one-seventh. Now (1890) there were over 1,569 sanitary authorities distributed over the Kingdom, of which 578 were rural and 994 urban. In the case of the former, medical officers had been appointed in 529, and 528 inspectors had been appointed. In the case of the urban authorities, 691 have medical officers, and 625 have inspectors of nuisances. Through the agency of the Local Government Board and its intelligent staff, all the medical and hygienic knowledge of the world was placed at the service of the public. They could, possibly, reasonably demand more inspectors, more expenditure, and wider recognition, but nevertheless an immense quantity of valuable work had been done by this body. Undoubtedly it was a moot question whether in the future centralisation or decentralisation should be the guiding star. The President suggested probably a compromise would best meet the case. However plausible and attractive the cry of decentralisation might be, it requires moderation. In introducing measures of a less popular kind it was very necessary to have it done through the medium of a central body. And in many other cases a central control was necessary. The Poor Law was instanced, which would never have been so well administered had it not been for a measure of central control. In going forward it is necessary to have patience; nothing ever good was done in a hurry, and all reformers should bear this in mind, but truly in a short time a great deal had been accomplished.

A vote of thanks to the President was proposed by Dr. DUDFIELD (Kensington), and seconded by Dr. LITTLEJOHN (Edinburgh), and in doing so alluded to the diminished death rates in the different cholera epidemics, as showing results of improved sanitation.

DIVISION II.—DEMOGRAPHY.

THE chair was taken by Mr. FRANCIS GALTON, F.R.S., at ten o'clock, in the Theatre of the Royal School of Mines, in Jermyn Street. He read the following opening address:—

In the address, which it is my honourable duty to deliver at the opening of this Congress, it would be presumptuous to obtrude opinions on any one of the larger parts of the subjects that will engage its attention. I am addressing experts who have practically dealt with the numbers and occupations, with the marriages, births, and deaths of millions of their countrymen; who have investigated on the largest scale the effects of past legislation, and collected new data in which accurate information was from time to time of pressing national importance. I have not had the experience necessary to justify my addressing you on these matters in their more familiar aspects. Instead of doing so, I will call your attention for a few minutes to certain topics of demographic inquiry which enter into the great problem of the future betterment of the human race.

They are confessedly, at the present time, hardly advanced beyond the stage of academic interest, but thought and action move swiftly now-a-days, and it is by no means impossible that a generation which has witnessed the exclusion of the Chinese race from the customary privileges of settlers in two continents, and the deportation of a Hebrew population in a third, may live to see other acts of any analogous kind performed under sudden socialistic pressure. The questions about to be considered may unexpectedly acquire importance as falling within the sphere of practical politics, and if so, many demographic data that require forethought and time to collect, and a dispassionate and leisurely judgment to discuss, will be hurriedly and sorely needed.

The topics to which I will allude are the relative fertility of different classes and races, and their tendency to supplant one another under various circumstances.

The whole question of fertility under the various conditions of civilised life requires more detailed research than it has yet received. We require further investigations into the truth of the hypothesis of Malthus, that there is really no limit to over-population beside that which is afforded by misery or prudential restraint. It is true that misery, in any justifiable sense of that word, provides the only check which acts automatically, or are other causes in existence, active, though as yet obscure, that assist in restraining the overgrowth of population? It is certain that the productiveness of different marriages differs greatly in consequence of unexplained conditions. The variation in fertility of different kinds of animals that have been captured when wild and kept in menageries is, as Darwin long since pointed out, most notable and apparently capricious. Most of those which thrive in confinement, and enjoy apparently excellent health, are nevertheless absolutely infertile; others, often of closely allied species, may have their productivity increased. One of the many evidences of our great ignorance of the laws that govern fertility is seen in the behaviour of bees, who have somehow discovered that by merely modifying the diet and the size of the nursery of any female grub, they can at will cause it to develop, either into a naturally sterile worker, or into the potential mother of a huge hive.

Demographers have, undoubtedly, collected and collated a vast amount of information bearing on the fertility of different nations, but they have mainly attacked the problem in the gross and not in detail, so that we possess little more than mean values that are applicable to general populations, and are very valuable in their way, but we remain ignorant of much else, that a moderate amount of judiciously directed research might, perhaps, be able to tell.

As an example of what could be sought with advantage, let us suppose that we take a number sufficient for statistical purposes, of persons occupying different strata or classes, those who are the least efficient in physical, intellectual, and moral grounds, forming our lowest class, and those who are the most efficient forming our highest class. The question to be solved relates to the hereditary permanence of the several classes. What proportion of each class is descended from parents who belong to the same class, and what proportion is descended from parents who belong to each of the other classes? Do those persons who have honourably succeeded in life, and who are presumably, on the whole, the most valuable portion of our human stock, contribute on the aggregate their fair share of posterity to the next generation? If not, do they contribute more or less than their fair share, and in what degree? In other words, is the evolution of man in each particular country favourably or injuriously affected by its special form of civilisation?

Whatever other countries may or may not have lost, ours has certainly gained on more than one occasion by the infusion of the breed of selected sub-races; especially of that of the Protestant refugees from religious persecution on the continent.

It seems reasonable to look upon the Huguenots as men who, on the whole, had inborn qualities of a distinctive kind from the majority of their countrymen, and who may, therefore, be spoken of as a sub-type, that is to say, capable, when isolated, of continuing their race without its showing any strong tendency to revert to the form of the earlier type, from which it was a well-defined departure. It proved, also, that the cross breed between them and our ancestors was a singularly successful mixture. Consequently England has been largely indebted to the natural refinement and to the solid worth of the Huguenot breed, as well as to the culture and technical knowledge that the Huguenots brought with them.

The frequency in history with which one race has supplanted another over wide geographical areas is one of the most striking in the evolution of mankind. The denizens of the world at the present day form a very different human stock to that which inhabited it a dozen generations ago, and to all appearance a no less difference will be found in our successors a dozen of generations hence. Partly it may be that new human varieties have come into permanent or only into temporary existence, like that most remarkable mixed race of the Normans many centuries ago, in whom, to use well known words of Mr. Freeman, the indomitable vigour of the Scandinavians, joined to the buoyant vivacity of the Gaul, produced the conquering and ruling race of Europe. But principally the change of which I spoke is due to great alterations in the proportions of those who belong to the old and well established types. The Negro now born in the United States has much the same natural faculties as his distant cousin who is born in Africa. The effect of his transplantation being ineffective in changing his nature, but very effective in increasing his numbers, in enlarging the range of his distribution, and in destroying native American races. There are now some 8,000,000 of Negroes in lands where not one of them existed twelve generations ago, and probably not one representative of the race which he displaced remains there; on the other hand, there has been no corresponding diminution of numbers in the parent home of the Negro. Precisely the same may be said of the European races who have during the same period swarmed over the temperate regions of the globe, forming the nuclei of many future nations.

It is impossible, even in the vaguest way, in the short time at my disposal, to give a just idea of the magnitude and variety of changes produced in the human stock by the political events of the last few generations, and it would be difficult to do so in any case in a manner that would not be likely to wound the patriotic susceptibilities of many or all of us. The natural temperaments and moral ideals of different races are various, and praise or blame cannot be applied at the discretion of one person without exciting remonstrance from others who take different views with perhaps equal justice. The birds and beasts assembled in conclave may try to pass a unanimous resolution with a large majority in favour of the natural duty of the mother to nurture and protect her offspring, but the cuckoo would musically protest. The Irish celt may desire the extension of his race and the increase of its influence in the representative Governments of England and America, but the wishes of his Anglo-Saxon or Teuton fellow-subjects may lie in the opposite direction, and so on indefinitely. My object now is merely to urge inquiries into the historical fact whether legislation, which has led to the substitution on a large scale of one race for another, has not often been the outcome of conflicting views into which the question of race hardly entered at all, and which were so nearly balanced that if the question of race had been properly introduced into the discussion the result might not have been different.

The recent attempts by many European nations to utilise Africa for their own purposes gives immediate and practical interest to inquiries that bear on the transplantation of races. They compel us to face the question as to what races should be politically aided to become hereafter the chief occupiers of that continent. The varieties of negroes, bautus, arab half breeds, and others who now inhabit Africa are very numerous, and they differ much from one another in their natural qualities. Some of them must be more suitable than others to thrive under that form of moderate civilisation which Europeans are likely to introduce into Africa. Such races would spread, and displace the others by degeees. Or it may prove that the Negroes, one and all, will fail as much completely under the new conditions as they have failed under the old ones to submit to the needs of a superior civilisation to their own, in which case their races, numerous and prolific as they are, will in course of time be supplanted and replaced by their betters.

It seems scarcely possible as yet to assure ourselves as to the impossibility of any variety of white men to work, to thrive, and to continue their race in the broad regions of the tropics. We could not do so without better knowledge than we now possess of the different capacities of individuals to withstand their malarious and climatic influences. Much more care is taken to select appropriate varieties of plants and animals for plantation in foreign settlements, than to select appropriate types of men. Discrimination and foresight are shown in the one case; an indifference born of ignorance is shown in the other. One aspect of this question will be discussed in the course of our proceedings, and I await the result with keen interest, and have no wish to attempt to forestall it. What I now desire to point out is the importance of a more exact examination and careful record than is now made of the physical qualities and hereditary antecedents of candidates for employment in tropical countries. We desire to judge how far medical forecast is justified by the result, and more especially to find out the conditions in youth that are prevalent among those whose health subsequently endures the change of climatic influence satisfactorily, and conversely as regards those who fail. It is scarcely possible to properly conduct such an investigation respectively.

In conclusion I wish to emphasise the fact that the improvement of the natural gifts of future generations of the human race is largely, though indirectly, under our control. We may not be able to originate, but we can guide. The processes of evolution are in constant and spontaneous activity, some pushing towards the bad, some towards the good. Our part is to watch for opportunities to intervene by checking the former and giving free play to the latter. I wish to distinguish clearly between our power in this fundamental respect and that which we also possess of ameliorating education and hygiene. It is earnestly to be hoped that demographers will increasingly direct their inquiries into historical facts, with the view of estimating the possible effects of reasonable political action in the future, in gradually raising the present miserably low standard of the human race to one in which the Utopias in the dreamland of philanthropists may become practical possibilities.

After reading his inaugural address Mr. Galton enumerated the conditions of debate, and called upon Dr. Ogle, M.D., F.R.C.P., to read his paper.

On the Relation of Occupation to Disease and Mortality.

After pointing out the importance of the subject, and the large space taken by occupations in determining death-rate, the writer showed how satisfactory statistics of the mortality in different industries can only be obtained in countries where, as in England, the census returns give the ages of persons engaged in each industry. He then explained how his statistics were obtained, and gave the following table of comparative mortalities of men, between 25 and 65 years of age, in different occupations; the death-rate of clergymen, the lowest of all, being taken as the standard of comparison, and represented by 100.

Comparative Mortality of Men, 25 to 65 Years of Age, in different Occupations, 1881-2-3.

Occupation.	Comparative Mortality.	Occupation.	Comparative Mortality.
Clergymen, priests, ministers	100	Carpenters, joiners	148
Lawyers	151	Cabinet makers, upholsterers	173
Medical men	202	Plumbers, painters, glaziers	216
Gardeners	108	Blacksmiths	175
Farmers	135	Engine, machine, boiler makers	160
Agricultural labourers	126	Silk manufacturers	152
Fishermen	143	Wool, worsted manufacturers	186
Commercial clerks	179	Cotton manufacturers	196
Commercial travellers	171	Cutlers, scissors makers	235
Innkeepers, liquor dealers	273	Gunsmiths	185
Inn, hotel, service	397	File makers	300
Brewers	245	Paper makers	129
Butchers	201	Glass workers	214
Bakers	172	Earthenware makers	313
Corn millers	172	Coal miners	160
Grocers	139	Cornish miners	331
Drapers	159	Stone, slate quarriers	202
Shopkeepers generally	160	Cab, omnibus, service	267
Tailors	189	Railway, road labourers	185
Shoemakers	166	Costermongers, hawkers, street sellers	338
Hatters	191		
Printers	193		
Bookbinders	210		
Builders, masons, bricklayers	174		

The causes to which the wide differences shown in the table were then considered and grouped under seven general headings, as follows:—

(1.) Working in a cramped attitude, and especially in one that interferes with the action of the thoracic organs. (2.) Overwork, and especially sudden muscular efforts and strains. (3.) Dealing with noxious substances, such as lead, phosphorus, mercury, infected hides, etc. (4.)

Working in ill-ventilated and overheated rooms. (5.) Alcoholic excess. (6.) Liability to accident. (7.) Exposure to inhalation of dust of various kinds.

These causes were severally considered, and statistical tables given illustrating their action.

Among these tables are the three following, illustrating respectively the 4th, 7th, and 5th causes :—

COMPARATIVE MORTALITY of MEN working in air of different degrees of purity from phthisis and respiratory diseases.

		Mortality from		
Air.	Occupation.	Phthisis	Diseases of Respiratory Organs.	Phthisis and Diseases of Respiratory Organs.
Pure ...	Fishermen ...	55 ...	45 ...	100
	Farmers ...	52 ...	50 ...	102
	Gardeners ...	61 ...	56 ...	117
	Agricultural labourers	62 ...	78 ...	140
Confined ...	Grocers ...	84 ...	59 ...	143
	Drapers ...	152 ...	65 ...	217
Highly vitiated	Tailors ...	144 ...	94 ...	238
	Printers ...	233 ...	84 ...	317

COMPARATIVE MORTALITY of MALES in certain dust-inhaling occupations from Phthisis and Diseases of the Respiratory Organs :—

	Comparative Mortality from		
Occupation.	Phthisis.	Diseases of Respiratory Organs.	Phthisis and Diseases of the Respiratory Organs.
Coal miners	64	102	166
Carpenters, joiners ...	103	67	170
Bakers...	107	94	201
Masons, bricklayers, builders	127	102	229
Wool, worsted, workers	130	104	234
Cotton workers ...	137	137	274
Quarrymen	156	138	294
Cutlers...	187	197	384
File makers	219	177	396
Earthenware makers	239	326	565
Cornish miners ...	349	231	580
Fishermen	55	45	100

MORTALITY of DEALERS in LIQUOR (25 65 years of age) from various Diseases, compared with that of Men generally of the same Ages :—

	Mortality of	
Diseases.	Liquor Dealers.	Men generally.
Alcoholism	55	10
Liver diseases	240	39
Gout	13	3
Diseases of nervous system ...	200	119
Suicide	26	14
Diseases of urinary system ...	83	41
Diseases of circulating system	140	120
Other diseases	764	654
All causes	1,521	1,000

Dr. JACQUES BERTILLON then read a paper on "Mortality in Relation to Occupation," comparing statistics obtained in Paris with the analogous tables published in England by Dr. Farr and Dr. Ogle, and with Swiss ones.

The discussion was opened by M. MILLIET, of Berne. He said that statisticians might be divided into two classes—the pessimists, to which class he himself belonged, and the optimists, who were well represented by Dr. Ogle and M. Bertillon. He spoke of the high mortality return among innkeepers in Switzerland, and spoke of the two different kinds of innkeeper, (1) solid, *i.e.*, those who followed their vocation all their lifetime; (2) accidental, *i.e.*, those who had tried several trades and failed to get on, and then had become innkeepers, so that other occupations connected with innkeeping, and not the trade itself, might be the cause of high mortality. Again, with regard to the Swiss guides, many of them during the winter followed some trade, such as that of a shoemaker, and were down in the census returns as such. Statistics even with such material was a very crude and unsatisfactory method of dealing with the subject.

M. VAILLANT then moved a resolution that "This Congress is of opinion that, in the interests of public health, the daily hours of workmen should be reduced as much as possible, and approves of the eight hours day."

The PRESIDENT thought it hardly advisable to follow the matter further, as no vote on a scientific subject could be taken, so that it would be undesirable to take one on a semi-political question.

M. VAILLANT, however, urged very strongly that the resolution should be put before the meeting, and the President finally decided to lay the matter before the committee.

SATURDAY'S EXCURSION TO CAMBRIDGE.—Members are particularly requested to note that they must follow the instructions on the back of the ticket, because these instructions are somewhat different to the times stated in the early announcement.

THE BARONESS AND MR. BURDETT-COUTTS'S GARDEN PARTY.—A most successful garden party was given yesterday by the Baroness and Mr. Burdett-Coutts. The beautiful gardens of Holly Lodge looked charmingly fresh, and the numerous guests appeared to appreciate to the full the lavish hospitality of their hostess, and to enjoy the music of the African Native Choir and of the band. The weather was fine till about half-past six, when a sudden downpour of rain occurred, and dispersed the late visitors.

PORTRAITS OF MEMBERS OF THE CONGRESS.—Messrs. Barraud have already taken, amongst others, the following portraits of members of the Congress: Professor Ritter von Zuraschek, Vienna; Professor Bela Foldes, Budapest; Dr. G. Ivanics, Zara, Austria; Dr. Albrecht Hudels, Paris; Dr. J. D. Frankish, Christ Church, New Zealand; Dr. Blom Costes, Holland; Dr. and Mrs. Lauder Brunton; Dr. Farquhar; Surgeon-General Bidie; Professor Hay, Aberdeen; Dr. Louis de Castasy; Professor G. Steward, Edinburgh; Professor Dr. Leo Bergenstein, Vienna; Baron von Bessing, representative of *Kreuz Zeitung*, Berlin; Dr. R. Schneider, representative of *Cologne Gazette*; Lord Provost Stewart, Aberdeen; Sir William Moore; Dr. Paul Chappines, Jersey; Dr. Albert Palmberg and Miss Tabaststjerna; Dr. Louis Csatary de Csatai, etc., etc.

VISIT TO THE DRAINAGE OF THE HOUSES OF PARLIAMENT.—The professors and students of the State College of Medicine, as members af the Congress, recently paid a visit to the Houses of Parliament, under the guidance of Mr. Ault, to inspect the Shone system of sewerage. Mr. Shone described by means of plans and sections the details. The party had next the opportunity of exploring the subways of the House, of seeing the method of ventilation, and the injectors. There is a large and beautiful model of the injector in the room where the sewage is forced to a higher level by the compressed air, by means of which the whole mechanism of the process can be traced. Members of the Congress can view the system by making application to Messrs. Shone and Ault, Great George Chambers, S.W.

INFLUENZA.—A report has come from Moscow that there is an outbreak of influenza in that city, and that as many as five hundred new cases were seized in a single day. It is possible that the numbers of those affected have been exaggerated, but it appears probable that there is at least some foundation in the report. Influenza is undoubtedly a contagious disease, and we shall be interested to notice whether this fact is recognised by Russian physicians, and what steps, if any, are adopted to check the spread of the malady.

CONVERSAZIONE AT THE GUILDHALL.

The Guildhall was seen to the best advantage last night. The beautiful and elegant character of its interior architecture was increased by a choice profusion of flowers, a blaze of light, crimson cloth, elegant toilettes, bright uniforms, and the life and animation of a varied assembly. The reception-room in which the Lord Mayor and Lady Mayoress received their very numerous guests was a distinct success from an artistic point of view, for, in addition to a lavish display of crimson and white—the Corporation colours, there were graceful folds of dark red material, and in all directions tall palms were judiciously placed, which gave beauty and effect to an attractive scene. The pavilion was well lighted by an array of brilliant lights hanging from the roof, which brought into strong relief a roofing of quaint figured material, which gave the temporary structure a very substantial appearance. The principal hall was also brightly illuminated, and hanging from the roof were the emblazoned banners of the arms of the principal livery companies, while below a profusion of graceful palms, elegant statuary, and vases fitly furnished the spacious apartment. The north and south courts, the Crypt, and the Old Council Chamber were improvised as refreshment rooms, and here the guests were regaled with champagne (G. H. Mumm, dry 1884) and light refreshments. The structural resources of the Guildhall were well utilised, as may be judged from the fact that the Justices' Room and the Lord Mayor's Court office were cloakrooms; the Aldermen's Court-room was a well patronised lounge; the Museum maintained its interesting characteristics, and the new Council Chamber was utilised as a concert hall. Here was Mr. John Thomas, the celebrated harpist, with a band of lady harpists, played in the most charming manner. In the principal hall the band of the Royal Artillery (under the direction of Cavaliere L. Zavertal) played a selection of military music, and in the reception room the band of the Grenadier Guards (conducted by Lieutenant Dan Godfrey) played various selections.

In the Council Chamber vocal music of the most entertaining type was centred under the direction of Mr. William Coates, the artistes being: Masters F. Dalton, A. Dearden, F. Barnes, A. R. Wells, and H. Simpson, and Messrs. Walter Coward, George May, William Coates, Edward Dalzell, Albert James, Charles Ackerman, and E. J. Bell.

The Library was one of the most attractive parts of the Guildhall, for here was gathered one of the finest collections of costly plate to be seen in the world. Besides these valuables in the shape of loving cups, urns, rosewater dishes, candlesticks, badges, maces, and wine flagons, were some of the most ancient charters and records of the Corporation, displayed under glass cases. For the convenience of the guests, an interesting and brief account of the Corporation and the Livery companies, and of the City of London was presented to each as they entered the building. Without going further into detail as to arrangement, it may be said that never before did the interior of the Guildhall look more charming, while the floral display added beauty, freshness, and colour in glorious variety to the rooms.

Shortly after eight o'clock, by which time a large number of guests had arrived, and were waiting in the Reception Room, a fanfare of trumpets announced the arrival of the Lord Mayor and Lady Mayoress, who were accompanied by Sheriff Sir William Farmer and Lady Farmer, Sheriff Sir Augustus Harris and Lady Harris, Mr. Under-Sheriff Beard and Mrs. Beard, and Mr. Under-Sheriff Shepheard and Mrs. Shepheard.

The process of reception lasted long, and was so fatiguing, that the Lord Mayor and the Lady Mayoress were at length obliged to sit down and bow their gracious acknowledgments as the guests passed before them. There were altogether more than two thousand present.

SOCIAL AND OTHER ARRANGEMENTS.

To-Day.

Garden party at Sir Edwin Saunders's, 4 p.m. to 7 p.m. Conveyances for the invited guests will leave Burlington House at 2 p.m. for "Fairlawn," Putney, returning at 7 p.m.

Lord and Lady Wantage's garden party, 4 p.m. to 7 p.m.

Reception at the National Health Society, with exhibition of nursing and sanitary appliances, 4 p.m. to 7 p.m.

Garden party at the Royal Normal School for the Blind, 2.45 p.m.

Soirée at the Royal College of Physicians, 9 p.m. to 12 p.m. (Gentlemen only.)

Dinner by the Public Health Medical Society.

Dinner by the Fellows' Club. (By special invitation.)

Visit to Refuse Disposal Company, Chelsea, 2.30 p.m. Limited to 48.

Health receptions, organised by the London Vegetarian Society and the Bread and Food Reform League, under the patronage of H.R.H. Princess Christian. These receptions will begin to-day, Wednesday, 4 p.m. The following will take part in the opening ceremony: The Lady Mount Temple, Sir Spencer Wells, Bart., M.D., F.R.C.S., J. R. Diggle, M.A., D. Dyce Brown, M.D., W. S. A. Griffith, M.D., F. R. Lees, M.D., Alfred Schofield, M.D., John F. Sykes, M.B., etc., etc. The chair will be taken by A. F. Hills, Esq., President of the London Vegetarian Society.

The staff of St. Thomas's Hospital invite the medical members of Congress to visit the hospital, 2 p.m., for the purpose of inspecting the hospital.

Dr. Albert Palmberg.—Dr. Palmberg, President of the Medical Society, Finland, and Vice-President of the Society of Hygiene, Finland, has presented to Congress the Swedish and French editions of his work, "Traité de l'Hygiene Publique d'Apres ses Applications dans Differents Pays d'Europe (France, Angleterre, Belgique, Allemagne, Autriche, Suede, et Finlande)." Dr. Palmberg is accompanied by his daughter and Miss Tabastatjerna.

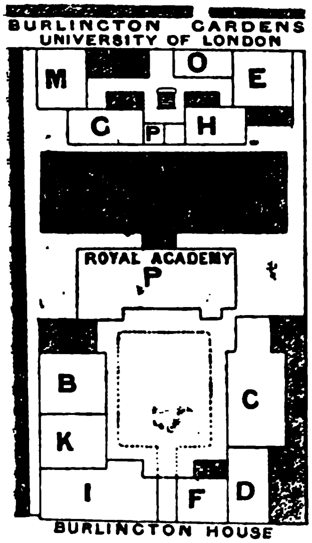
Jones's "Fume Cremator," Refuse Destructor, Sewage Works, and Model Isolation Hospital, Ealing, W.—These works will be thrown open on Thursday to a limited number of 60 members, in connection with the Engineering Section. The chairman of the Ealing Local Board will provide lunch at the Public Buildings, Ealing, at half-past two. Train leaves the Westminster Bridge District Station at 1.22 p.m., and Bishop's Road, Paddington, at 2.10, for Ealing Broadway Station.

Death of Dr. Vinen.—We regret having to announce the death of Dr. Vinen, one of the oldest medical officers of health, and also of the Society. He joined soon after its formation, and speedily accepted the office of honorary secretary, which he filled for many years. He was much respected by the members for his unfailing courtesy and for his great attention to his duties. As an instance, on the occasion of the great snowstorm (blizzard) in 1881, he, the writer of this notice, and two others attended a meeting of the Society which was held that night. His attention to the duties was so highly estimated by the Society that after several years' service a sum of above £60 was subscribed to present him with a testimonial consisting of a pair of silver candelabra and an illuminated address. He continued his duties for many years afterwards, when ill-health compelled his resignation not only of his secretaryship, but of his office of medical officer of health to the St. Olave district.

PUBLIC HEALTH,

)FFICIAL ORGAN of the CONGRESS of HYGIENE and DEMOGRAPHY, 1891,
AND
The Journal of the Society of Medical Officers of Health.

N OF THE PLACES OF MEETING.



REFERENCES.

Opening Meeting. St. James' Hall.
Section 1. Preventive Medicine.—Antiquaries Society, Burlington House.
Section 2. Bacteriology.—Royal Society, Burlington House.
Section 3. Diseases of Animals.—Geological Society, Burlington House.
Section 4. Infancy and Childhood.—Theatre of the London University.
Section 5. Chemistry and Physics.—Chemical Society, Burlington House.
Section 6. Architecture.—West Examination Room, London University.
Section 7. Engineering.—East Examination Room, London University.
Section 8. Naval and Military.—Linnæan Society, Burlington House.
Section 9. State Hygiene.—Astronomical Society, Burlington House.
Section 10. Demography.—Museum of Geology.
Reception Room. Library, London University.
Ladies' Reception Room. Agnew's Gallery, Bond St.
Committee Room.
Press Room. Royal Academy of Arts.
" " London University.
" " Museum of Geology.
Gibson and Diploma Galleries, Royal Academy of Arts.

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ic Health.—All communications and letters for Health should be addressed to Professor Wynter offices of Public Health, Burlington House. the journal not be received after order, subscribers ested to communicate direct with Messrs. Colling· 49, Aldersgate Street, E.C.

THE SEVENTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

The work of the Congress was continued yesterday, and the ten simultaneous meetings were well attended, especially Sections I., II., and IV.

DIVISION I.—HYGIENE.

SECTION I.—PREVENTIVE MEDICINE.

Discussion upon Diphtheria.

A discussion upon Diphtheria was set down for this morning, and at ten o'clock Sir **Joseph Fayrer**, the chairman, called upon Dr. Seaton to open it.

Dr. **Seaton** spoke very briefly. He called attention to the experience, extending over five years, that had been gained from consideration of the cases of diphtheria and typhoid admitted into the hospitals of the Metropolitan Asylums Board. These cases, he said, came from all parts of London, especially from districts that were notably free from other diseases, and in the occupation of the comparatively well-to-do. In Kensal Town, for instance, he noted that the fatal results from diphtheria were three or four times as numerous as in Chelsea, where all the ordinary causes of death from contagious disease were much more rife. Dr. Seaton then mentioned the case of a village quite near London, which enjoyed complete immunity from diphtheria, and from any disorder that could be confounded with diphtheria. Here a new system of sewerage was constructed, with the remarkable result that a severe outbreak of diphtheria immediately occurred. *Post hoc*, or *propter hoc?* The inhabitants accused the drainage system, and Dr. Seaton allowed that the disturbance of the soil might have led to the freeing of the germs. This, however, he said, opened up an admirable field for inquiry. Dr. Seaton concluded by saying that there is a strong ground for urging on Government the necessity of a systematic and comprehensive inquiry into the causes of diphtheria, including in such inquiry the places known to be free from the disease, and taking into consideration the results of previous investigations as to the carriage of infection by milk, its relation to dirt, dampness, and insanitary surroundings.

Sir **Joseph Fayrer** then called upon Dr. E Schrevens, of Tournai.

Dr. **Schrevens** said: The true origin and the cause of the spread of a diphtheritic invasion can only be arrived at by examining carefully the results in different countries, and taking into consideration the different favourable circumstances. I am in a position to speak to this Congress for Belgium upon these matters, as, thanks to M. Kuborn. the President of our Royal Society of Public Medicine, a registration system has been adopted for this disease in the various provinces of Belgium. I have the results of this system for the ten years from 1871 to 1880 inclusive, and have also the same information with regard to typhoid fever, and I have observed, and my observations are borne out, that these diseases run concurrently—where the one is severe the other is severe, where the one is mild the other is mild, but diagrams constructed from the statistical results show one exception—that of Eastern Flanders.

One is led to believe that the connection between these two diseases must be their origin from fæcal matter, and the bacteriological researches of Löffler and Eberth agree with this view. The exception in the case of Eastern Flanders confirms the theory, for the soil here is so humid that it is easily washed clean from all impurities, and we should not expect to find the same definite results. If we want another proof that we must look to the soil for the cause of diphtheria, let it be noted that the mortality is not commensurate with the density of the population, but is much higher in the country, where the soil-surfaces are not so carefully looked after as in a well-drained town. Moreover, some connection between animal and human disease may exist, and in my opinion certain fowls have a great tendency to harbour the germs of diphtheria. Dr. Schrevens concluded by pointing out that early notification of cases to a local bureau, and a strict isolation system towards the sufferers, can alone prevent the spread of diphtheria.

Dr. Schrevens was followed by

Dr. Hewitt, of Minnesota, whose interesting paper was received with some applause. Minnesota, he said, is an entirely new country. Thirty years ago it contained only 50,000 inhabitants, and now there are nearly a million and a half. It must, then, be interesting to note the development of the disease in a virgin country, whence all the ordinary predisposing causes are absent. The topographical and climatic peculiarities of Minnesota are marked. It has an average elevation of 1,000 feet above the sea. Many rivers, and in the valleys numberless tributaries to the Mississippi in the south, and the Red River of the north. Between them lie high alluvial plains. The changes of climate are brusque, and in winter, at times, severe. The population are mostly strong and healthy, engaged in agricultural pursuits. They are also the descendants of hardy pioneers and settlers, and of all foreign nationalities. In this country diphtheria made its appearance about 1860, and must now be considered the most common cause of death but two, the two more deadly diseases being the diarrhœa of infancy and tuberculosis. Diphtheria started among the families settled on the banks of the great streams, and for some time remained a family disease, owing to the isolation of these small settlements, but later it spread to the higher plains, when the increasing business of the country led to increased intercourse. At first it was confused with ordinary tonsillitis, or typhoid fever, or *scarlatina anginosa*, but later it was recognised, and careful accounts kept of these cases. Dr. Hewitt received the co-operation of all the medical officers of the State in his attempt to arrive at definite conclusions from the figures received from all these sources. He arrived at the following two conclusions: (1) From twenty to thirty years of age women are more liable than men to diphtheria. This he accounts for by the fact that the disease is very contagious, and that the cases have generally been nursed by women in this decade. (2) Forty-four per cent. of all cases, regardless of sex, occurred at five years and below.

The Chairman then called upon Dr. Bergeron for his paper upon the

Spread of Diphtheria in Europe during the last Fifty Years,

and left the President's chair in favour of Dr. Pistor, of Berlin.

The following is a translation of Dr. Bergeron's valuable and courteous testimony to the effects of English sanitary improvements:—

I do not claim any credit for originality in making this communication to the Congress. My task has been simply to collate and record for you the information that, in my official capacity, I have received from my confrères as to the uninterrupted spread of diphtheria in France. It would be most interesting to make some attempt to arrive at the true origin of diphtheria, and to discuss the date of its birth, and the question whether it was known to Hippocrates—as some say—or practically discovered by M. Bretonneau, as is very generally received; but such discussions lead to nothing practical, and the time of the Congress will be better occupied by the consideration of facts. The charts which I circulate among the company show that in the five largest towns of France diphtheria has now become endemic, and has indeed, during the last thirty years, advanced in prevalence. In Paris there can be no doubt of this spread, even in the absence of statistics. I can myself remember the rarity of cases of diphtheria or croup during my term as house surgeon at the Hôpital des Enfants in comparison with its comparative frequency in my wards as a physician fourteen years later. Indeed, if I did not trust in future hygienic developments, and the good results to be obtained from such meetings as these, I should be horrified at the spread of the disease during the past few years. In Lyons the spread has been slower and less regular, and the outlook for this year is so far promising that it may be hoped that the period of subsidence which always follows great epidemics has now arrived for this town. At Marseilles and at Bordeaux the rise has fluctuated, being neither very definite nor very rapid, and in Bordeaux it must be remembered that there have been great accessions to the population. But at Lille the situation is graver; the population has not increased, but the rate of mortality from diphtheria has regularly grown higher. I have taken these five large centres of population as examples, but a cursory glance over all the sanitary statistics of France and Algeria shows the disease to be greatly on the increase, and, indeed, to constitute a veritable calamity for our country. To what causes are we to attribute this incessant progress? Has the disease become modified? Is it changed in its type, and has it become more contagious? One must think so, because the disease spreads in these days more rapidly, while we now take so much more precaution against its contagious nature. Diphtheria is we now know—leaving aside the questions of its germ origin —a specific and contagious disease, but we are unable to class it among what M. Brouardel calls avoidable diseases, such as typhoid fever or small-pox, because we know nothing as yet of its origin. Therefore, to combat it we are reduced to disinfection and isolation; we cannot as yet take preventive measures. With regard to disinfection, if we believe that the virus exists in the false membrane, as I do, it follows that all the emanations should be destroyed, and all fomites most vigorously disinfected. I have not any intention to say more on this subject here. With regard to isolation, is there any disease (as M. Brouardel has well pointed out) about whose infective nature we are more in the dark? We have no idea of the time at which diphtheria becomes dangerous to others, nor how long the period of danger endures. If only this Section can, by deliberation, arrive at some conclusion with regard to the period of quarantine that should be enforced upon the sufferer from diphtheria, so as to make the disease in this respect analogous to measles, scarlatina, or small-pox, it will, indeed, be able to congratulate itself upon having done good work. It is my own belief that the disease is transmissible from the moment that the white pellicle (film), which later is to become the false membrane, makes its appearance, and the sometimes almost simultaneous affection of child, mother, nurse, neighbour, only points to a very short incubation period.

Of course there are difficulties in the diagnosis of the nature of the laryngeal, or nasal affection, but if we know that the germ resides in the discharges, it is very clearly indicated that these discharges should be destroyed with all due precaution. It follows also that the period of isolation should be dictated by the duration of the discharges from the passages affected. This of course varies in different cases

It is my own habit to isolate sufferers up to any period not exceeding six weeks. I have never known a case of transmission from a patient after the lapse of this time. Schools must be closed. One word in conclusion. The book of M. Monod has lately informed us that the general mortality in England has, thanks to its sanitary organisations, decreased 3·44 per 1,000 during the decade from 1880 to 1890. This is a very striking result, and although the decrease has not been quite so noteworthy in the instance of diphtheria as in that of one or two other contagious diseases, it compares very favourably with the undoubted increase of diphtheria mortality in our country, and we shall be happy to learn from you the prophylactic measures which have conduced to this result.

Dr. **Felix**, of Bucharest, and Dr. **Gibert**, of Havre, followed with brief notes on the spread of diphtheria in these towns.

Dr. **Gibert**, of Havre, said that diphtheria appeared at Havre in 1860, being at first local in its distribution, but later spreading throughout the town, and reaching an acme of severity in 1885. A special crusade against diphtheria, called a Brigade de Salubrité, was then inaugurated, and by regular notification of cases and disinfection of the unhealthy localities the disease has been nearly stamped out. In Dr. Gibert's opinion, if all the doctors of the town will continue to supply accurate information to the authorities, the extinction of the disease is only a matter of time.

The **Chairman** then called upon Dr. Abbott for his report upon

DIPHTHERIA IN MASSACHUSETTS.

Dr. **Abbott** gave a general statement of the topography, the climate, and the vital statistics of the State, as an introduction to the special topic. The full report was illustrated by tables and maps.

The term diphtheria does not appear in the registration reports of the State until 1858, a fact which has but little bearing upon the question of its prevalence at an earlier period.

From 1858 the annual number of deaths assigned to this cause rapidly increased until 1863, when 1,420 deaths were reported from this cause, and 1.231 in 1864. There was then a rapid decline till 1867, when there were but 251 deaths registered from this cause, and the annual number continued at quite a uniform rate of about 275 deaths for the next seven years, when it rose again to 2,610 in 1876, and 2,734 in 1877. The ratios of mortality per 10,000 of the population from this cause were shown in a diagram.

The general death-rates of the population for the same period are also expressed in the same manner, by which it appears that the diphtheria death-rate bears no relation to the general death-rate, except in the period 1862 to 1867, when the two curves appear to run nearly parallel. But in 1872, when the general mortality rate was at its highest point and infectious diseases were generally very prevalent, the diphtheria death-rate was far below the mean, and in 1876 and 1877, when the general death-rate was quite near the mean, the diphtheria death-rate was at its highest point.

The following table gives the death-rate of diphtheria and croup, according to age :—

Ages.	Diphtheria.	Croup.
Under 5	36 87	27·86
5 to 10	19·80	4·63
10 to 15	5·38	·29
15 to 20	1 66	·05
20 to 30	·80	·02
30 to 40	·58	·03
40 to 50	·36	·02
50 to 60	·34	·02
60 to 70	·54	·01
70 to 80	·53	·02
Over 80	·41	·06

The numbers of deaths from which the foregoing table is computed are 29,422 of diphtheria and 14,590 of croup.

The range of age distribution in the different districts is very considerable, the ratio of children under five in the smallest district under consideration, and also that which has the lowest ratio, being 6 1 per cent. in Nantucket, and the highest ratio being 10 2 per cent. in Suffolk county.

The relation of the mortality from diphtheria and croup to the population living under five years of age shows that the rank of some of the districts is slightly changed as compared with their position in the preceding column, in those counties which have a nearly identical rank in the second column.

For the sake of comparison with the excellent tables of Dr. Longstaff, presented in the report of the Local Government Board of 1887, I have divided the 14 counties into three groups, to which the terms dense, medium, and sparse districts are applied, the first applying to those in which there is less than one acre to each person living. This includes only the metropolitan district of Suffolk county. The second (medium) applies to those in which there is one acre, but less than two acres to each person. This comprises the counties of Essex, Middlesex, and Bristol. The sparse districts, those in which there are more than two acres to each person, comprise the remaining counties. In this grouping, the small island counties of Dukes and Nantucket are reckoned with Barnstaple county, their general characteristics, both of population and of climate being quite similar. In the densely settled district, having but 6 100 of an acre to each person, the average annual mortality rate from diphtheria and croup was 12·7 per 10,000 of the population. In the medium districts, in which the average density was 1·4 acres to each person, the mortality-rate was 10·2 per 10,000.

In the sparsely settled districts, in which the average density was 4·8 acres to each person, the mortality rate was 8·8 per 10,000 annually.

Assuming the mortality of the dense districts as 1,000, we have the following results :—

Mortality from diphtheria in dense districts, 1,000.
" " " medium " 803.
" " " sparse " 609.

While these figures present a result which differs from the statistics of England and Wales, it should be remembered that they are compiled from a population less than one-tenth as large, and are, therefore, less trustworthy as sources from which conclusions are to be drawn.

In another point, however, the conclusions agree with those of Dr. Longstaff, and that is, that in the second half of the period the towns suffered, relatively, more than in the first half.

In eighteen out of the twenty-eight cities, their mortality-rate from diphtheria and croup had materially increased from the first to the second half of the period of eighteen years under consideration, and these eighteen included the six largest cities of the State.

The districts which suffered most severely, taking the whole period of eighteen years, were the northern half of Berkshire county. That portion of the valley of the Connecticut River within the State, which lies in Hampshire and Hampden counties, and the valleys of the Westfield and Chicopee Rivers, with the tributary valleys of the latter, the southern half of Worcester county, the metropolitan district about Boston, the Merrimack River valley, the southern sea-coast region of Essex county, the eastern part of Norfolk county, the eastern border of Bristol county, the north-west corner of Plymouth county, and the town of Nantucket.

Those regions which had the greatest immunity were the southern half of Berkshire county, the whole of Franklin county, the east and west parts of Hampshire county, the west part of Hampden county, the northern half of Worcester county, the north and west part of

Middlesex, the north-east sea coast district of Essex, the west half of Norfolk the western border of Bristol, nearly all of Plymouth, and the whole of Barnstaple and Dukes counties.

In comparing the distribution of fatal diphtheria and croup in the State with that of other diseases, certain other similar inquiries relating to the other principal infectious diseases tend to show that diphtheria is "not regulated by the same causes as influence the general mortality," except that, so far as the density of population is concerned, the results of observations in Massachusetts lead us to an opposite conclusion from that which is derived from the statistics of England and Wales.

In the course of personal inspections made in many parts of the State, in city, town, and country districts, my observations tend to support the following statement found in the report already quoted, with reference to the increasing severity of prevalence in towns as compared with country districts.

"If we grant for a moment the exciting cause of the disease to have its origin in the country, it is just possible that the constantly increasing communication between town and country, by affording additional opportunities of importing the disease, might account for its increased prevalence in towns.

"Although the greater proximity of people in towns would, at first sight, seem to increase greatly the chances of infection, it is by no means certain that the individuals of a town community come so much into personal contact as the dwellers in a lonely hamlet. There may be but few opportunities for the introduction of the poison into an isolated village, but once introduced there are great facilities for its spread. In a village, everyone knows his neighbours, whereas in a large town, dwellers in the same street are often complete strangers to each other."

In the same line of investigation, and in harmony with the foregoing quotation, the following extract from a paper presented at the eighteenth annual meeting of the American Public Health Association, held at Charleston, S.C., is herewith quoted:—

"The following inquiry was directed to be made by the State Board of Health of Massachusetts in 1889. In a city in which diphtheria was epidemic 100 houses were selected for examination and inspection. A recent and quite severe epidemic had prevailed, in which there had been 174 deaths from diphtheria in the course of the year (1889). Fifty houses were selected in which cases of diphtheria were known to have occurred within 12 months prior to the time of inspection; 50 other houses were selected in which it was known that no cases of diphtheria had occurred during the previous five years. In general terms the houses of the latter class were as nearly identical with the former in their location, construction, and the social condition of their inmates as possible. On inspection, the actual sanitary condition of these houses was found to differ but little in the two classes. Defects of plumbing, want of proper traps, leaks in drain pipes, and other similar defects were found about equally in the two. Not one of the 100 houses had special provision for ventilation. In one point only did there appear to be a marked difference in the two classes, and that was in the ratio of damp cellars. In the houses in which diphtheria had existed, the ratio of damp cellars was as eight to five when compared to the houses of the other class. I believe this is in accord with the observations of others to the effect that where diphtheria has once been introduced from without, it finds in dampness a congenial soil for its propagation.

"If it is desired to trace the course of an epidemic of diphtheria amid the mazes of a densely-crowded city, there can be no more difficult task imagined. The daily influx and efflux of population to and from the suburbs, the thronging of people in shops, markets, factories, steam-cars, horse-cars, and electric cars, the crowding together at lectures, church services, entertainments, theatres, and, finally, in the public and private schools, give the best facilities for the spread of epidemic disease. On the other hand, isolated communities occasionally present excellent opportunities for the careful study of the methods of spread of such an epidemic disease as diphtheria. Such a case presented itself to my notice during the past year. A quiet old town in Berkshire county, near the source of the Farmington River, has comparatively little connection with the outside world. It is eighteen miles from the nearest railroad, has no hotel, and has but little regular traffic with neighbouring towns. In the spring of 1888 a school-teacher, a native of this town, was employed as teacher of a school twenty-five miles distant. At the close of her term of teaching, in June, 1888, she went home ill, her illness proving, on her arrival home, to be diphtheria. Within the next six months cases occurred in the immediate family of this young woman and those of her relatives, no quarantine having been enforced. It spread across the street to the house of the family physician. Several deaths occurred in these two families. The family of the physician was shattered, and he left the town, his house being abandoned and vacant for several months. The postmaster of the village was also the village grocer. People went to and from the post-office from the first infected house, and the grocer also made frequent visits to the house with his groceries. His family was next attacked, and so severely as to be broken up and scattered. After the house of the village physician had remained vacant several months, and some inefficient attempts at disinfection had been practised, a new physician moved into and occupied the vacant house. Soon after moving in, his children were attacked. A lying-in woman whom he attended, together with her seven-year-old boy, were both attacked. A neighbour who called upon this woman was next attacked; and so the history of this epidemic could be traced from house to house, and from one individual to another for a period of eighteen months or more. The houses of these people which were visited did not appear to be especially filthy, but in two or three instances excessive dampness of the neighbouring soil was noticed. In the case of the physician, whose family was attacked after moving into the house which was formerly infected, the permanence of the diphtheritic germ appears to be illustrated. This history of successive outbreaks occurring in one house after the lapse of a long interval is not uncommon.

"The history of the disease in the small town to which I have referred was that of introduction from without, and then of continuous infection from one person to another through the public schools, the unwise visits of inquiring friends, the usual household visits of the grocer, the want of care on the part of the attending physician, and many other similar avenues of communicability."*

The foregoing observations are submitted merely as a small contribution to the history of diphtheria. So far as the writer's observations are concerned, they lend weight to the following conclusions:—

1. That diphtheria is an eminently contagious disease.

2. That it is infectious, not only by direct exposure of the sick to the well, but also through indirect media, such as clothing and other articles that have come in contact with the sick.

3. That the certainty of infection is not so great as in the case of some of the other infectious diseases, notably small-pox and scarlet fever.

4. That overcrowding, faulty ventilation, and filthy condition of tenements favours its spread.

5. That the influence of defective plumbing is not proven.

6. That its transmission through public and private water supplies is not proven.

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* "What Constitutes a Filth-Disease," a paper read by S. W. Abbott, M.D., at the meeting of the American Public Health Association, at Charleston, S.C., December 18th, 1890.

7. That its propagation is favoured by soil-moisture, damp cellars, and general dampness of houses.

8. That the poison may remain ineffective in houses for a long period.

Dr. Abbott was followed by

Dr. ADAMS, of Maidstone, who read a paper entitled

THE RELATIONSHIP BETWEEN THE OCCURRENCE OF DIPHTHERIA AND THE MOVEMENT OF THE SUB-SOIL WATER.

At this point Surgeon-General Roth, of Saxony, took the President's chair.

CHARLES E. PAGET, M.R.C.S., D.P.H., Medical Officer of Health for the County Borough of Salford, then read a paper on

A LOCAL EXAMINATION OF THE DIFFERENCE IN SUSCEPTIBILITY TO DIPHTHERIA BETWEEN OLD AND NEW RESIDENTS.

In further consideration of the facts relating to a recent extensive epidemic of diphtheria which prevailed in the Borough of Salford during the years 1888, 1889, and 1890, the suggestion has been made that, as a contribution to the general pathology of the disease, it would be useful to know if any difference in the susceptibility to disease could be detected between the old residents of unhealthy places in the borough and the new comers to them. Such differences have been often observed in different countries. I have, therefore, made an effort to discover if similar differences were observable in different parts of the same town. Unfortunately it was not until late in the year 1888 that special inquiry was made as to the length of residence in their respective houses of the persons attacked with diphtheria. I can, therefore, only give the facts of residence as they appeared for the years 1889 and 1890; and I have no evidence as to whether the new comers had moved from other houses in the same neighbourhood or from greater distances. Moreover, the circumstances of an epidemic must, I fear, interfere somewhat with the accuracy of any indications as to the influence of residence, owing to the special increased liabilities to the contraction of the disease which are usually presented in an epidemic period. At the same time the indications, as far as they go, may possess some interest, and for this reason I beg to lay them before the members of this Congress.

I must premise, for the sake of clearness, that there are four principal divisions of the Borough of Salford, namely, the Regent Road, the Greengate, the Pendleton, and the Broughton districts. In my official report on this epidemic I showed—

(i.) That diphtheria had prevailed extensively in the borough thirty years previously, when the population was rather less than half its present amount, 198,717, and that the disease had never been absent from the borough during the 30 years following;

(ii.) That the epidemic reported on began about the end of the year 1887, spread chiefly by means of personal infection, was not due to the distribution of any general food supply, and could not be shown to be related to infection from any domestic animals.

(iii.) That the disease could not be shown to have been specially prevalent in localities in which the soil had been polluted by having been used for the "tipping" of organic refuse; and

(iv.) That the spread of the disease appeared to have been assisted by such conditions of house-drains and of sewers as had tended to the deposit and retention in them of offensive and infectious matters.

There were special facilities for the infection of the sewers and drains from many very mild cases of the disease in the earliest stages of the epidemic, before its nature had been generally recognised. This fact, together with that of communication by personal infection, are the important points to be borne in mind in connection with the further special inquiry. As the result of my first inquiry was to establish that it was from one or other of these sources of infection that the disease principally spread in the borough, the question of the power of resistance of each individual attacked may be dealt with solely with regard to these two sources of infection.

The localisation of cases of diphtheria from the year 1883 was rendered possible owing to local notification of infectious diseases having been in operation from the beginning of that year; and according to the records of that and subsequent years down to the epidemic period, it appeared that the very low-lying portion of the Broughton district, which is bounded on two sides by the river Irwell, was that most constantly affected by diphtheria; that the disease was somewhat concentrated in the much smaller Greengate district, which is also low-lying, and is the oldest part of the borough; and that, until the disease assumed an epidemic form, there was only a scattered distribution of cases in the Regent Road and Pendleton districts.

The following is a short summary showing the chief periods of residence and the percentages of cases occurring within them:—

Districts of Salford.	Periods of Residence. 1 to 5 Months.	6 to 12 Months.	Under 1 Year.	1 to 2 Years.	2 to 3 Years.	3 Years & over.
Regent Road	22·8	19·6	42·4	13·8	14·1	29·9
Greengate	23·9	14·5	38·4	16·2	11·1	34·5
Pendleton	14·6	16·3	30·9	16·7	10·0	42·4
Broughton	9·2	10·7	19·9	17·1	19·0	43·9

Thus it may be gathered:—

1. That the four districts of the borough showed considerable variations in the incidence of diphtheria attacks in respect of previous length of residence.

2. That the incidence among residents of from one to two years, and from two to three years, in each of the four districts was smaller than among residents of less than one year or of over three years.

3. That the heaviest incidence of cases was, in the Broughton and Pendleton districts, associated with a three year or longer residence.

4. That in the Broughton district, where the disease was apparently more specially endemic, the number of attacks was proportionately less among one-year residents than in any of the other districts.

5. That the Pendleton district presented somewhat similar facts to the Broughton district.

6. That the Regent Road and Greengate districts both showed a remarkable incidence of the disease, equal to more than one-fifth of the total incidence in those districts, among residents of less than six months standing, and a smaller percentage of attacks among residents of three years and upwards than did the other two districts.

These indications taken in conjunction with the results of previous inquiries—namely, that the most probable methods by which the spread of disease was effected were personal intercourse and the infection of faulty sewers and drains, and that it was not due to any other specially serious insanitary condition affecting particular portions of each district, unless the special liability of Lower Broughton be excepted—oblige one to look into the general differences of the four districts.

The chief feature of difference between the districts is the relation of their population to their respective acreage. The density of population per acre is, in the Regent Road district, 73·6; in the Greengate district, 117·2; in the Pendleton district, 20·7; and in the Broughton district, 26·2. While, moreover, the Greengate district is practically completely built over, and the Regent Road district is nearly so, the Pendleton and Broughton districts contain considerable areas not yet built upon, and are better ventilated.

Another notable difference between the districts, doubtless in part dependent on density of population and on ventilation, occurs in their general mortality rates. While the Regent Road District has an average general death-rate of about 27 4 per 1,000 of population, the rate in Greengate is about 31·4, in Pendleton 23·6, and in Broughton 19 2. This variation in general district mortality corresponds roughly with the general sanitary differences of the four districts in respect of ventilation and facilities for change of air. So also where ventilation of inhabited portions of the borough was least effectual, or where the inhabitants could least easily obtain fresher air in open spaces, there the average length of residence before an attack of diphtheria was generally found to be shorter. In other words, as the people of a district were more subjected to the continuous influence of their insanitary surroundings, they were found less fitted to resist the infection of this zymotic disease.

The result then which I think that I have been enabled to arrive at in this inquiry is that a shorter average period of residence elapsed before an attack of diphtheria was observed where the general mortality rate was highest, and *vice versâ*; that, in fact, the relative incidence of diphtheria during an epidemic period, in respect of length of residence, was dependent to no small an extent on general sanitary circumstances.

I should have liked to have made this inquiry more complete by calculating the proportions of persons infected at particular periods of residence as against the total population resident for like periods in the several districts, but the figures have not been attainable, and I have preferred not to guess at them. I should like, too, to think that some of the figures arising from this investigation support in some degree a belief, which I hold strongly, that residence in infected places does confer some measure of immunity similar to that given by repeated inoculations of weakened virus; but the inquiry has necessarily been of too limited a character to justify my claiming that for them.

I shall be satisfied if only this line of inquiry be considered a useful one, and worthy to be followed out more completely in a general and official investigation as to the remarkable prevalence of diphtheria in this country.

The discussion was continued by Professor Dr. D'Espine (of Geneva), Dr. Tripe, Dr. Günther (of Dresden), Dr. Janssens (of Brussels), Dr. Hubert, Dr. Thursfield, and Dr. Escherich, and concluded at one o'clock.

SECTION II.—BACTERIOLOGY.

Discussion on "Immunity."

Dr. Roux, of the Pasteur Institute, opened the discussion on "Immunity" by reading a paper, in which he began by singing Pasteur's praises, and dwelling on his researches in connection with the attenuation of virus and preventive inoculation. With the exception of vaccination, the only method of conferring immunity is by inoculation of a substance obtained from the bacilli of the disease itself. Pasteur was the first to attenuate this specific virus. But the virus may be weakened without being attenuated. Pasteur describes two principal methods of attenuation: 1. Prolonged exposure of cultures to air. 2. Passing the virus through various animals. Heat, antiseptics, cold, etc., may also be used as weakening agencies. If attenuation is brought about too quickly, the virus becomes inactive. Immunity may be induced by inoculating the products of the specific bacillus, or by inoculating certain inorganic chemical substances, but the former is of by far the greatest importance. The products necessary to confer immunity are not always produced in artificial cultivations, rendering the preventive vaccination a much more complicated operation in these cases. Dr. Roux went on to discuss the nature of these chemical products, which *were thought to* be of the nature of alkaloids, and were now recognised to be albumoses. These substances were poisonous or preventive, according to the dose given, and it was necessary to begin with small doses and gradually increase them till immunity was established. Bacteria may produce in their growth different substances, some of which were preventive in suitable doses, others distinctly injurious. After speaking about the successful vaccination of guinea pigs for diphtheria, he concluded by discussing the nature of the action of these substances in producing immunity.

Dr. Buchner, of Munich, then read a paper on "Immunity."

After Dr. Buchner had read his paper he summed up his opinion on the phagocytosis theory as follows: That we are still ignorant of the essential cause of immunity, and the conditions under which it arises are not as yet supported by sufficient experimental basis. He would rather tend to the theory that immunity was induced by some action of the blood apparently independent of the amœboid cells.

Mr. E. H. Hankin, of Cambridge, now read the following paper on

IMMUNITY.

Since Pasteur's celebrated discovery that it is possible to make animals immune against chicken cholera and other diseases by the use of attenuated vaccins, the nature of immunity, whether natural or acquired, has attracted to an ever increasing extent the attention of bacteriologists. Year by year new theories have been brought forward to explain these phenomena. It is not my intention to attempt to discuss these earlier theories, partly because I prefer to leave this to abler hands, partly because the more recent theories on this subject tend rather to supplement than to exclude their predecessors. I should like, however, to point out how our modern views on this subject are acquiring greater precision and definiteness as time goes on. The view that acquired immunity was due to an alteration of the metabolism of the tissue cells, either in general or at the seat of infection (Gravitz Buchner), is now known as the phagocyte theory, with which the name of Metschnikoff will ever be honourably connected. The supposition of Chauveau and others that immunity was caused by the presence of some unknown substance of bacterial origin, is now overshadowed by the results obtained by many workers who have actually found bacteria-killing substances in immune animals, whose nature and origin, however, appears to be very different from what Chauveau's theory might have led us to expect. It is to a consideration of this view of the nature of immunity that I propose chiefly to devote my paper.

Towards the end of 1888 Nuttall discovered that various bacteria are destroyed when mixed with fresh blood or blood serum, and further, that this destruction cannot be ascribed to the action of cellular elements, but rather to the fluid part of the blood. This discovery (which really arose from the German criticism of Metschnikoff's phagocyte theory) was soon followed by the work of Buchner and Nissen, and these observers came to the conclusion that this bactericidal action of the cell-free blood serum is a weighty factor in the conflict between the organism and the microbe. A further confimation of this view is to be found in the interesting discoveries of Bouchard. He first showed that the blood serum of an ordinary rabbit will serve as a culture medium for the bacillus pyocyaneus. If, however, a rabbit is made immune against the disease produced by this bacillus its blood serum has acquired the power of attenuating and even destroying the microbe in question. Thus, it was shown that by making an animal immune against a disease the bactericidal action of its blood serum was greatly increased. Similar results have since been obtained with the microbes of cholera, anthrax, and other diseases. Among these must be mentioned the recently published work of Emmerich and Mastbaum on pig typhoid. Not only have these observers found that the microbes of this disease are killed by the blood serum of rabbits that have been rendered immune against it, but they have successfully employed such serum to cure the disease after it has appeared in other susceptible animals. These discoveries concerning the bactericidal action of blood serum led to another of a very different, and I may say, unexpected, nature. I refer to the work of Behring and Kitasato on tetanus and diphtheria which appeared at the end of last year. With these last-named diseases our attention is at once drawn from the microbes to the poisons they produce. The microbes of tetanus and diphtheria do not spread through the body of the infected animal, as is the case with anthrax. On the contrary, they remain in the immediate neighbourhood of the seat of inoculation. There they elaborate their deadly poisons, which, when absorbed into the system, produce, as is well known, various disastrous effects. For instance, an inoculated guinea pig will in some cases develop typical diphtherial paralysis long after the last diphtheria bacillus has vanished from its system, and practically the same clinical effects can be produced by an injection of a minute dose of the poison made by the diphtheria microbe as by the microbe itself. Fränkel, Behring, and other observers agree that scarcely any tolerance can be obtained by successive inoculations of minute doses of the unaltered diphtheria poison; consequently such a procedure can scarcely be expected to lead to a sure way of producing immunity against this disease. How, then, it may be asked, can we ever hope to find a cure for diphtheria? Suppose, for example, a substance was discovered which could kill the diphtheria microbe without harming the living animal tissues, how could this cure disease when it has once appeared? The blood serum of rats possibly contains such a substance, but what could be the use of using it to destroy diphtheria bacilli in a patient if it leaves untouched the diphtheria poison, which, in the absence of the microbes that produced it is quite capable of destroying the health of the patient?

The above-mentioned work of Behring and Kitasato disposed of the pertinency of these questions. These bacteriologists succeeded in making rabbits immune against tetanus and diphtheria. They found that the serum of a diphtheria-immune rabbit (to confine our attention to one of these diseases) exerts no bactericidal action on the diphtheria bacillus. It possesses, however, the remarkable power of destroying the poison produced by this microbe. In this antitoxic power of such serum we at once see a possibility of curing tetanus and diphtheria (for the above statements hold good for both diseases), and, as a matter of fact, it has been found possible to cure either disease in mice and guinea pigs. Indeed, Behring has cured mice of tetanus in which the disease had so far progressed that several of the limbs were in a condition of spasm. Gamaleia has obtained results with the poison of the Vibrio Metschnikovi which go to confirm these of Behring and Kitasato. He found that this poison is destroyed by the blood serum of the rabbit, but not by that of the guinea-pig; these animals being by nature respectively refractory and susceptible to the attacks of this microbe. Thus we see that the discovery of the bacteria-killing power of blood serum, besides suggesting a new direction in which practical results may be expected, leads us to a new theory of immunity which may be stated as follows:—

"Immunity, whether natural or acquired, is due to the presence of substances which are formed by the metabolism of the animals rather than by that of the microbe, and which have the power of destroying either the microbe, against which immunity is possessed, or the products on which their pathogenic action depends."

It may be noted that this theory, as I have stated it, does not attempt to exclude other factors. It is possible, or, indeed, probable, that in some animals immunity against some diseases depends either wholly or in part on other causes.

The question now arises, what is the nature of the substances on which this bactericidal action of blood serum depends?

Buchner attempted an answer to this question two years ago when he first attacked the subject. He carefully tested the action of each one of the known constituents of blood serum on bacteria. Not one of them showed the slightest bactericidal action. He successively showed that the bacteria killing action of blood serum could not be ascribed to salts present, to traces of fibrin factors, or to the other proteids of serum. Consequently he arrived at the somewhat curious conclusion that this power of destroying microbes possessed by blood serum was due to a remnant of the "vitality" that had been possessed by the blood-plasma from which the serum was derived.

It is difficult to see in what sense of the word such a statement is an explanation of the bacteria-killing power of blood serum, and when I first read it I was once at reminded of Professor Huxley's comparison of "vitality" with the idea of Martinus Scriblerus, who explained the operation of the meat-jack by its inherent meat-roasting power, and scorned the materialism of those who sought to explain its action by some hidden mechanism in the chimney.

Another possibility existed—namely, that Buchner had overlooked some constituent of blood serum, and that to this unknown constituent the bacteria-killing power of blood serum was due.

It would lead me too far for me to attempt to detail the theoretical considerations that led me to suspect that a particular ferment-like proteid known as cell globulin B was the substance in question. At any rate, I tested its action on anthrax bacilli, and found that it possesses the power of destroying these microbes.

I further found that similar substances were present, not only in animals that are naturally immune against anthrax, but also in those that are susceptible to this disease. To those substances I have given the name of defensive proteids. In my published papers on this subject I have noted various similarities in the bactericidal action of these substances, and that possessed by blood serum, and these resemblances are such as to leave little room for doubt that the bactericidal action of blood serum is due to the presence of these defensive proteids.

It is obvious that the mere presence of these bodies in the animal organism does not compel us to regard them as a means of resistance to microbe invasion. Before we can regard them as a real factor in the production of immunity it must be shown that the defensive proteid of a refractory animal is more active, or is present in a larger quantity than is the case with an animal that is susceptible to a given disease. This very necessary proof I sought to obtain by a study of the defensive proteid of the rat. This animal is known to be highly resistant to anthrax. Behring, in 1888, showed that its serum is more alkaline than that of any other animal that he examined; further, that it has the power of killing anthrax bacilli, which power is lost when the serum is neutralized. He came to the conclusion that the immunity of the rat to anthrax is due to this high alkalinity of its serum, but was unable to isolate the alkaline substance involved. Naturally, my work on defensive proteids enabled me to attack this question from a more favourable standpoint, and I soon found that this serum contained a proteid body possessing a well-marked alkaline reaction, and a power of destroying anthrax bacilli. Further, when injected into mice, along with fully virulent anthrax spores, it would prevent the development of the disease. On the other hand, defensive proteids of animals susceptible to anthrax can exert no such protective power, and consequently these experiments indicate a difference in the mode of action of defensive proteids from immune and susceptible animals respectively. Further, the amount of defensive proteid present in a rat can be diminished by those causes which are known to be capable of lowering its power of resisting anthrax. For instance, Feser states that rats become susceptible to anthrax when fed on a vegetarian diet. I have obtained similar results with wild rats. The ordinary white rat, however, I have found to be generally refractory to anthrax on any diet, and always the defensive proteid can be obtained from its spleen and blood serum. With the wild rat this is not the case. In one experiment eight wild rats were used. Of these four were fed on bread and meat, the others on plain bread, for about six weeks. Then one rat of each lot was inoculated with anthrax. Of these the one that had been subjected to a bread diet succumbed. The remaining rats were killed, and it was found that while the spleens of the flesh-fed rats contained abundance of the defensive proteid, only traces of this substance could be obtained from the spleens of the rats that had been fed on bread alone. A similar result was obtained in other experiments.

Very young rats are known to be susceptible to anthrax, and so far as I can judge from the litmus test (after dialysis and addition of Na. Cl.), their serum appears to contain less of the defensive proteid than does that of the adult rat. Further, I have found that a young rat can be preserved from anthrax by an injection of its parent's blood serum.

These facts appear to me to prove that the defensive proteid of the rat deserves its name in that it tends to preserve it from the attack of the anthrax microbe; in other words, that this substance is at any rate a part cause of its immunity against anthrax.

Ogata, Tizzoni, and Cattani have recently made some interesting additions to our knowledge of defensive proteids. Ogata has, by methods very similar to those which I have employed, extracted a bacteria-killing substance from blood serum of various animals. The low temperature at which it is destroyed, and its solubility in 50 per cent. glycerine, have led him to the idea that it is a ferment. He shows, however, that it possesses no diastatic or peptonising power. Tizzoni and Cattani have similarly come to the conclusion that the "anti-toxic" substance present in the serum of a dog that has been made immune against tetanus, is a proteid body allied to ferments. So far as I know, these are the only workers besides myself who have yet published papers dealing with this subject. Wooldridge, in his well known experiments on anthrax immunity produced by tissue fibrinogens, may (as I have elsewhere suggested) have been working with a solution containing a defensive proteid, but this idea of a bacteria-killing substance seems neither to have directed his work or to have been clearly deducible from his results.

Since the publication of my work on defensive proteids, Buchner has abandoned his view that the bacteria-killing power of blood serum is due to a remnant of vitality, and in a paper recently published he admits the importance of defensive proteids, and suggests for them the name "alexine." Certainly if it were necessary to re-christen "defensive proteids," this name would be very appropriate. As defensive proteids have, however, succeeded in surviving for a year and a-half under this title, I feel inclined to claim the discoverer's privilege and ask that they may continue to exist under their original denomination. It would, however, be convenient to form names for the different classes of defensive proteids, and I do not think it would be premature to do so now. Defensive proteids appear to be ferment like, albuminous bodies, and it is extremely unlikely that we shall for a considerable time be able to classify them by any other than physiological tests. From this point of view it is possible to divide them into two classes; first, those occurring naturally in normal animals, and, secondly, those occurring in animals that have artificially been made immune. For these two classes I propose the names of *sozins* and *phylaxins*. A "sozin" is a defensive proteid that occurs in a normal animal. They have been found in all animals yet examined, and appear to act on numerous kinds of microbes or on their products. A "phylaxin" is a defensive proteid which is only found in an animal that has been artificially made immune against a disease, and which (so far as is yet known) only acts on one kind of microbe or on its products.

Each of these classes of defensive proteids can obviously be further subdivided into those that act on the microbe itself, and those that act on the poisons it generates. These sub-classes I propose to denote by adding the prefixes "myco" and "toxo" to the class name. Thus, myco-sozins are defensive proteids occurring in the normal animal, which have the power of acting on various species of microbe. Toxo-sozins are defensive proteids also occurring in the normal animal, having the power of destroying the poisons produced by various microbes. Myco-phylaxins and toxo-phylaxins similarly will denote the two sub-classes of the phylaxin group.

The classification may be represented by the following scheme:—

- Defensive proteids (Hankin) Alexins (Buchner)
  - Sozins: Defensive proteids present in the normal animal.
    - Myco-sozins: Alkaline globulins from rat (Hankin), destroying anthrax bacillus.
    - Toxo-sozins: Of rabbit, destroying V. metschnikovi poison (Gamaleia).
  - Phylaxins: Defensive proteids present in the animal after it has artificially been made immune.
    - Myco-phylaxins: Of rabbit, destroying pig typhoid bacillus (Emmerich).
    - Toxo-phylaxins: Of rabbit, &c., destroying diphtheria and tetanus poisons (Behring and Kitasato, anti-toxin of Tizzoni and Cattani).

When first the bactericidal action of blood serum was worked out, it was supposed that a serious blow had been struck at the phagocyte theory. The discovery of defensive proteid shows, however, that this is by no means necessarily the case. I first obtained defensive proteids from the spleen and lymphatic glands of various animals. That is to say, they were obtained from cells which are potentially phagocytes. It is possible that they are the weapons used by phagocytes in their conflict with the microbes, and that only after the death of the cells do these substances find their way into the blood serum. Though it may be held probable for phylaxins, there is as yet no formal proof that sozins are present in the living blood plasma. The fact that sozins are present in the serum no more proves their presence in normal blood plasma than does the presence of the allied body, fibrin-ferment in the one prove its presence in the other.

Professor Emmerich, of Munich, then followed with a paper. The following being an abstract:—

Through Emmerich's research on the cause of immunity and the cure of infectious diseases, it was established that the cause of artificial immunity resides in an anti-bacterial but so far as the body-cells are concerned, innocent toxin. This matter, inimical to bacteria, can be introduced into the body by vaccination; but it is also possible that the same substance may be formed from the body-cells themselves by the stimulus of an invasion of bacteria; or it may be a soluble chemical combination, which the bacteria form through the mutual reactions of a peculiarly modified decomposition-product of the body-cells, and the products formed by the bacteria. The pathological phenomena produced by all infectious diseases are parenchymatous swelling and fatty degeneration. In the first, the cells are filled with albuminous material, which decompose, and in part pass into fat. It is very probable that with the latter almost all abnormal modifications of cellular activity form these bodies, which act as bactericides, and produce immunity. These bactericides are possibly, therefore, intermediate products of decomposition, a stage in the passing of albumen into fat. Hence it is probable that the blood and tissues of immune animals, which contain matter energetically poisonous to bacteria, must also act as a remedial agent in infectious maladies, if injected subcutaneously. This conclusion has been recognised experimentally in two infectious maladies, viz., swine erysipelas and croupous pneumonia. Erysipelas and pneumonia are curable. They can be cut short by the injection of the blood or tissue-juice of immune animals. Even the outbreaks of these maladies can be quite stopped, if a short time after an infection with a pure culture of the pathogenic micro-organism, the tissue juice of immune animals be injected. The tissue-juices in the blood of artificially immune animals have different degrees of activity according to the method of producing immunity in them. If rabbits become immune through subcutaneous injection of weakened cultures, imperfect immunity is produced, and the tissues and fluids produce imperfect immunity also in other animals. Through injection of highly diluted virulent cultures into the veins, complete, and, one may say, ideal, immunity is produced, and the tissues and fluids have the property of producing immunity in other animals. Dr. Doenessen has established that rabbits inhaling for an hour a broth-culture of pneumonia-diplococci almost without exception sicken with pneumonia, and die in two to four days; but if they have previously received an intra-venous injection of 20·25 c.c. of a much diluted diplococci-culture of immune rabbits they do not die of pneumonia if made to breathe from one to three hours the same microbes.

According to the researches of Dr. Doenessen, it is highly probable that the Fränkel diplococcus is the cause of croupous pneumonia, so that the hope is justified that in the same manner, by the use of the juices of immune animals, human pneumonia may be cured or epidemics prevented.

As the time was getting on, the President decided to hear the discussion on the foregoing papers before proceeding with others to be read.

Professor Arloing and Dr. Kitasarto spoke shortly, followed by Dr. Adami, of Cambridge, who drew comparisons between the Metschnikoff school of phagocytosis and those who combine his theory with the bacteria-killing properties of the serum of the blood. He then referred in high terms to Dr. Hankin's recent researches on the action of rats' blood in producing immunity to anthrax, round which the discussion seemed to turn.

Professor Ehrlich and Professor Hueppe followed with remarks on the papers read, the former detailing some original experiments with regard to autitoxine bodies.

Dr. Klein spoke of being able to make frogs and rats susceptible to anthrax by administering an anæsthetic composed of chloroform and ether. These experiments only applied to anthrax, and he thought there was only one explanation, which was that certain chemical changes were established in the blood which were quite independent of phagocytosis. The experiments described were conducted with Dr. Coxwell.

Dr. Metschnikoff now rose to reply to criticisms on his theory. He was greeted with much applause, and was allowed by the President to take his own time, not being limited, as usual, to ten minutes. He referred to the complete destruction of bacilli by the amœboid cells, the different stages of which were demonstrated by drawings and some microscopic specimens to be seen in the hall outside. He spoke at length of the vibrioMetschnikoffi, showing elaborate drawings at the same time. The different stages, sizes, and shapes of the bacilli during their absorption by the cells were then described. He drew distinctions between the bacilli in vaccinated and unvaccinated animals and the behaviour of the cells in each case. In conclusion, he said he would very much like to show his preparations in detail, and to reply at length to the criticisms of Drs. Buchner and Emmerlich, but time would not allow. The speech was received with much applause.

Professor Fodor (Buda Pest) said that he was among the first to study the action of cells on bacteria, but that he does not now hold quite the same views as put forward by the last speaker. He thinks that there is more of an alkaline substance which is inimical to pathogenic bacilli. He then described some experiments with alkaline cultures.

Dr. Cartwright Wood (London) contributed a short paper on immunity, describing the protective influence as probably a "specific memory of the cells" which must be acquired gradually. He then described experiments with inoculation of mixed pathogenic germs, describing the protective influence one pathogenic germ has against another.

Professor Babes (Bucharest) spoke of the nature of the substance conveying immunity as probably of the nature of albumose as shown by precipitation experiments.

Dr. Wright had not time to read his paper, but described his experiments on tissue fibrinogen, which substance was first discovered by Wooldridge, but has not proved to protect against anthrax, as was at first thought to be the case. If, however, this tissue fibrinogen be boiled for two hours and then injected, it produces the same results as when albumose is injected, but he does not think it to be either an albumose or globulin, but belongs to the class of nuclear albumens. Intravascular coagulation can be produced. Dr. Wright has had some success in producing immunity by injecting preparations of tissue fibrinogen, thus showing that Wooldridge was on the right track.

Dr. Buchner and Dr. Roux replied shortly to criticism on their papers, and Dr. Metschnikoff finished the morning's proceedings by further remarks on his theory of phagocytosis.

SECTION III.—RELATION OF DISEASES OF ANIMALS TO THOSE OF MEN.

Yesterday the work of the session began with the reading of an abstract of Dr. Ballard's paper in his absence. Then followed a paper read by Dr. Vaughan.

A discussion on these two papers was opened by Dr. Blanchard, followed by Professor Fleming and by Professor Brown. A few words then followed from Professor Klein, who showed on the screen a number of photographs illustrating the paper which had been read by Dr. Ballard.

Then followed a most important paper by Dr. Klein. The room was packed, and the veterinary profession seemed specially strongly represented.

In the discussion the following gentlemen took part: Professor Crookshank, London; Professor Ostertag, Berlin; Professor McFadyean, Edinburgh; Professor Walley, Edinburgh; Mr. Hunting, M.R.C.V.S., London; Henry E. Armstrong, D.Hy., M.O.H., Newcastle-on-Tyne; Dr. Collins, London; Professor Chauveau, Paris. The following gentlemen also took part in the discussion, which at times was rather heated: Dr. Hime, Bradford; Dr. Turner; Dr. Bostock Hill, Birmingham; Professor Brown, London.

MEAT INFECTIONS—FOOD POISONING.

By Edward Ballard, M.D., F.R.C.P., F.R.S.

I have undertaken, at the request of the Council of this Section, to open the discussion of the third question which it has been arranged that the Section should consider, viz., "Infection of Meat, Milk, and other Comestibles." It is a subject which has come largely into prominence of late years, during which the mode of m rbific infection of food and the manner in which such infection comes to operate on the human body have been made matter of diligent research. Carrying back my memory to an antecedent period, little was known beyond this, that occasionally symptoms of poisoning followed the use of apparently wholesome kinds of food, but the phenomena of food poisoning were not in any case that I recollect identified with those of any known specific disease, with the exception perhaps of choleraic diarrhœa or cholera nostras.

Milk especially, prior to about twenty years ago, was regarded as invariably a particularly wholesome and harmless kind of food, and gastro-intestinal disturbances, obviously resulting from the eating of flesh-foods, or of soups, etc., prepared from them, were commonly attributed to accidental impregnation of the food with such metallic poisons as copper or antimony, or, in rare instances, to some chemical change in its organic constituents, the nature of which, if it differed at all from ordinary putrefaction, was unexplained, and at that time inexplicable. Indeed, much of the etiological research of the last 20 years has had reference to the production of disease in man through the agency of his food. Investigations into the spread of certain specific fevers, such as enteric fever and scarlet fever, through milk, took the lead at all events in this country, investigations which have always appeared to me to have been the natural outcome of the epoch-making labours of Dr. John Snow on the relation of epidemic cholera to infected water, and the subsequent demonstration by others of a similar origin in the case of outbreaks of enteric fever.

Of necessity all that could be at first established as to the spread of specific disease by milk, by the comparatively rough method of clinical inquiry, was the bare fact of the milk being accidentally infected, and capable, when so infected, of conveying the specific contagion into the human system. But since the rise and cultivation of the science of bacteriology, new and more delicate methods of research have become available. We have now been taught by the experts in this branch of physiological and pathological microscopy, and by the complementary work of organic chemists, a great deal that we wanted to know about the nature of that which we were in the habit of calling "*materies morbi*," and where this has been determined a good deal further about the connection that sometimes exists between an animal furnishing food, and the disease that food may produce in man. And this new method of research has further become available for the elucidation of the phenomena of what has been called "food-poisoning." I propose in this communication to the Congress to limit my remarks to this latter branch of the subject which is to occupy the attention of the section to-day, and to lay before the section the results of a short series of experiences which, during the last ten or twelve years, have fallen to the lot of the medical department of the Local Government Board of this country, experiences which very largely derive such value as they possess from the devoted labours of Dr. Klein, who has always been obligingly ready to favour the Board and the department with his invaluable assistance.

Fourteen instances of such poisonings out of a larger number that have from time to time come under the notice of the Medical Department of the Local Government Board are available for my present purpose, and will serve to illustrate the points to which I desire to draw the attention of the Section. Some of them have been fully reported in the published reports of the medical officers; others have been published elsewhere. Dr. Ballard here gave a list of the outbreaks. He next detailed the well-known Welbeck epidemic, the Nottingham series of cases, the Chester case, the Oldham and other cases.

His conclusions are as follows:

1. I may quote the words of Dr. Buchanan, the Medical Officer of the Board. He says (19th Report, p. xiii.):—

"The phenomena which we speak of as 'food-poisoning,' productive now of one and now of another sort of definite malady among consumers of certain foods, are claiming, on ever-growing evidence, to be regarded as true infective diseases, as much so as scarlatina or tuberculosis. That they have not been generally admitted into this rank arises, first, from the circumstance that some of them have seemed to be wanting in an incubation period; and, secondly, because they are rarely recognised as transmissible from person to person. But from our researches of this very year (1888) we derive some new considerations that materially affect the importance of incubation, as determining the infective nature of a poison; while we need go no further than the experiences of Middlesbrough in 1888 to find suggestion of disease-bacteria operating alternately through the atmosphere and through infection of food material by them."

2. In infected food capable of producing disease on being eaten we find one or both of two things—a living microscopic organism and an organic chemical poison of greater or less virulence.

3. Of these two things, that which is immediately operative in the production of the morbid phenomena is the chemical poison which is apparently of a basic nature and a product of the processes of bacterial life.

4. Specifically different bacteria capable of producing this chemical poison may through its agency give rise in the human system and in animals to clinical phenomena and pathological changes in the organs which are so similar that at present they cannot be distinguished.

5. Given the bacterium and favourable environment, the bacterium may grow, multiply, and produce its own special chemical poison from the material which affords it nourishment either outside the body or within it. One important element of environment is temperature. If a bacterium will not grow at the temperature of the body, it of course will not produce its operative chemical poison when introduced into the system.

6. Moreover, both the bacterium that produces the chemical poison in an infected food and the chemical poison itself may apparently be evanescent; perhaps in the former case the bacterium being killed by its own products, and perhaps in the latter case, because the chemical poison undergoes destructive changes. Hence an infected food poisonous when eaten at one time may fail to be poisonous when eaten at a later period, or poisonous when inoculated at one time may cease to be so later on; or one portion of an infected mass of food may be poisonous, and another part not be so.

7. It is to be observed that in many cases of food poisoning an incubation period has been distinctly traced, in others it has been less obvious; in some there was practically none, only from half an hour to a few hours elapsing between taking the food and the initial symptoms of the malady. This presence and absence of incubation may be taken as clinical evidence of the symptoms being due to the operation within the body of the bacterium itself, or of their being due (at first, at all events) to the operation of the chemical poison already prepared in the food. Where merely the bacterium is introduced, time is required as in other specific infections for the growth and multiplication of the micro-organism in the body, with the formation there of its poisonous chemical product. When the chemical poison already prepared outside the body is introduced, it operates more speedily, the rapidity of the operation being proportional to its quantity and quality, and the individual peculiarities of the recipient. In the several series under consideration the instances of long incubation (where it has been possible to ascertain the fact) occurred in cases where there was no doubt of bacteria having been introduced into the system, as in the Welbeck and Nottingham ham and pork cases, and the Retford pork pie case. I had reason to think that in the case

of the Middlesbrough bacon the incubation period was 18 to 36 hours, or perhaps a little longer. On the other hand, where it was certain that no bacterium was introduced in the food or one which would not grow at the temperature of the body, as in the Chester sausage case, the Wolverhampton tinned salmon case, and the Iron Bridge veal pie case, or was non-pathogenic on inoculation as in the Portsmouth instance, the illness commenced at periods varying from half an-hour to 10, 12, 14, or 17 hours only after eating. But in some of these food-poisoning series of cases there were individuals who suffered quickly and others who suffered after a longer interval. It was so in the Welbeck series of cases, where the interval varied from less than twelve hours to more than forty-eight hours; in the Nottingham pork case, where it varied from about twelve hours to thirty-four hours; in the Whitchurch pork case (No. 7), from seven to over nineteen hours; in the Carlisle (A) case from six to forty-three hours, and in the Retford case from under four to about thirty-six hours after eating. The interpretation of these varieties appears to be that, in the food eaten, the bacterium capable of developing in the body and the chemical poison already formed in the food were not equally distributed through the mass of the material, one individual case getting more of the one and another more of the other in the portion given him. Where, as in the Whitchurch pork case (No. 7), persons who fed upon the food latest had the shortest interval and the most severe attack, the interpretation may be that the individuals who fed at an earlier period got the bacillus in an active stage, when little of the chemical poison had been produced in the food, and those who fed later on got a larger dose of the chemical poison for the more abundant productions of which by the bacterium time had been afforded by the postponement of the eating.

8. As regards the kinds of animal food which in the adduced instances produced mischievous or fatal results. Of the fourteen instances food was or consisted largely of—

Pig-meat of one kind or another in	9 instances.
Veal...	1 instance.
Beef...	1 „
Butcher's meat (kind unstated)...	2 instances.
Tinned salmon	1 instance.

I am disposed to think that this is no unfair representation of the relative frequency with which swine's flesh thus gives rise to specific diseases of the kinds referred to, as compared with animal food from other sources. Certainly, apart from these instances, this corresponds with my general experience, and I expect the experience of the profession at large. What explanation can be offered of this? There is no reason whatever to believe (quite the contrary) that the food in any of the instances above recorded, contained the specific micro-organism before it was prepared for food. The American pork that, converted into mild bacon at Middlesbrough, was a means of conveying to persons eating it a specific pneumonic fever was obtained from American firms at Chicago and elsewhere of the highest repute, and consignments of the same brand at about the same time to other similar bacon makers at Stockton, only a mile or two distant, did not spread any epidemic, so far as I could learn, among its consumers; nor did other hams or bacon than those which produced disease at Welbeck, although made from the same consignment of American pork, produce similar disease to the Welbeck epidemic. And it is to be noticed that in the Nottingham pork case and the Bishop's Stortford beef case (No. 5) other portions of the carcases were eaten harmlessly. And this is an observation I have made in other instances of food poisoning within my experience.

The truth of the matter seems to be that the accession of the specific bacillus to the food is what we commonly call "accidental," which of course only means in this case that it comes from somewhere beyond our present knowledge. We do not know its normal habitat, but assuredly it now and then becomes air-borne, infects food of a kind that affords it appropriate nutriment, multiplies and produces its appropriate chemical poison there, and produces its appropriate specific disease in persons who consume the infected food. I have elsewhere suggested a similar hypothetical explanation of epidemic summer diarrhœa, another unquestionable specific disease. But if we do not know where the normal home of the bacillus is, nor how it escapes to do mischief, we do know something about the circumstances under which it gains access to food, which may help to elucidate even this point. It is to be noted that in every instance except one (No. 2), the Nottingham pork case, it was food that had been prepared a day or longer previously to its consumption, stored in one way or another, and then eaten cold, which produced disease. And it is the conditions under which the preparation of the food took place, and under which it was subsequently stored, that, in certain of the instances narrated, served to furnish a clue to the knowledge we want. The observations I made indicate an infectiveness of the place where these things were done, in association with uncleanliness of air, of soil, or of surface. I must be content to refer to my reports on the Welbeck and Nottingham cases, and to my summary of the Carlisle (A) case, as evidence of this, and notably to my report on the Middlesbrough outbreak, where the circumstances of the processes of bacon-making at Middlesbrough and Stockton are contrasted. Still, all this does not explain the special liability of pig-meat to produce these specific maladies. How is this to be accounted for? I have been disposed to gather a suspicion of what the explanation is from what I have said above about the Nottingham pork case, viz., that it was perhaps the gelatinous gravy and not the flesh of the pork that was really the peccant material. I could not hear of anyone having been made ill by eating the pork served to them after it had become cold, which, of course, would have been without gravy. And the explanation I have to suggest is this, that of all adult flesh meats ordinarily eaten, pork under the process of cooking furnishes the largest proportion of gelatin. Young meats, such as veal (used in the Iron Bridge case), are also largely productive of gelatin; and gelatin is a favourite nutriment of morbific bacilli. We may note how many of the articles of food most generally partaken of at the Carlisle wedding breakfast were gelatinous or gelatinised. These were the cold American ham, which moreover was glazed on the surface with gelatin, the game pie, the cold boiled salmon, and among the sweets the jellies and the trifles. Of two or more of these everyone that was taken ill had partaken. The Portsmouth case illustrates the same point, since a boy who ate nothing but gelatinous gravy (with pie-crust that was beyond suspicion) was made as ill as others who had eaten the meat of the pie.

9. And yet another word, before I conclude, on the practical application of all this. What does it all indicate as an efficient precaution against food poisoning? Of course no one is likely to be hindered by any fear of infection from eating cold ham or gelatinised food of any kind if he likes them. But if we do eat ham or bacon, cold or warm, it is a proper precaution to avoid them if not duly cooked throughout. The people who chiefly got pneumonia in Middlesbrough were a class who habitually only warmed the bacon they ate by slightly toasting it before a fire; they did not heat it sufficiently to kill any micro-organism; and hotel hams (indeed, hams cooked at home too) are rarely thoroughly cooked. But the grand precaution of all is the very commonplace one signified by the word cleanliness. Every factory where pork is converted into brawn or hams ought to be so arranged that light and a draught of

air can penetrate freely everywhere; there should be no corners where refuse matter can lodge and become a centre for the cultivation of morbid micro organisms in filth; the rise of ground air should be obviated by cement under the pavement or flooring; and the place should be kept scrupulously clean and free from incursions of sewer air or putrid emanations of any kind. Kitchens, and above all pantries and places where food is stored in hotels, public refreshment rooms, or pastrycooks' premises, and in private houses, should be similarly cared for. It should be held to be part of the business of conservators of public health to see that these rules are observed, as well as the business of every master or mistress of a family.

The following paper by VICTOR C. VAUGHAN, U.S.A., was then read:—

THE INFECTION OF MEAT AND MILK.

The infection of meat and milk may be discussed under the following heads:—

1st. The infection may be due to a diseased condition of the animal from which these foods are obtained.

2nd. The infection may be due to the inoculation of these foods with specific pathogenic micro-organisms outside the body of the animal from which they are derived.

3rd. Meat and milk, especially the latter, are often infected with saprophytic toxicogenic bacteria.

The transmission of disease by the use of flesh or milk has been repeatedly shown to occur. Cases of Gartner of Jena illustrate this. A cow suffering from mucous diarrhœa was killed. Post-mortem examination showed patches of inflammation in the intestines, and enlargement of liver and spleen, but the flesh, normal in odour and colour, was passed by the veterinarian as fit for food. 57 persons in 25 families were made ill by eating the meat. A vigorous young man ate 800 grammes of the raw meat at eight p.m.; two hours later he began to vomit and purge, and 35 hours after he died. Post-mortem it was found that there was an inflammatory condition of small intestine and swelling of peyloris patches. Those who ate the meat raw or insufficiently cooked were much the most seriously affected. In many cases there was fever running as high as 40 40° C. In the severe cases which recovered there was desquamation. In the meat and in the tissue of the dead man Gartner found a short bacillus, which he has designated by the name bacillus enteritidites. Susceptible animals inoculated with pure cultures of this germ died. The chemical poison was not isolated, but its existence was demonstrated by the fact that sterilised cultures injected into animals caused sickness and death. The outbreak of meat poisoning investigated by Gaffky and Paak most probably belongs to this class. The poisoning was by means of sausages, the symptoms headache, vomiting, and purging. From the sausage a short bacillus was isolated, which when given by the mouth or injected into animals produced the same symptoms. The chemical poison was not isolated. In the Welbeck cases Ballard has given a good description, and Klein has isolated the bacillus from the hair eaten. That chemical poisons may be transmitted is shown by history of poisoning with mussels and fish. As early as 1827 Combe described cases of poisoning by eating mussels, and a recent contribution to this subject has been made by Somidtman. The disease known to the Japanese as hakka, and which is said to be identical with beri beri, and is prevalent at Tokio from May to October, and is generally subacute. The symptoms are paralysis of diaphragm, with dyspnœa and interruption to the action of heart.

2. The infection of meat and milk outside the body of the animal with specific pathogenic bacteria. Typhoid fever, diphtheria, and other diseases are known to be thus disseminated.

3. It is not necessary that food be infected with some specific micro-organism before it can be rendered unfit for use. I will briefly discuss the nature of some of these germs. Many belong to the saprophytic organisms; the germs have not been derived either directly or indirectly from a diseased animal. A case of poisoning by custard, investigated by Dr. Vaughan, illustrates this. The custard made from the milk was divided into two portions, one flavoured with lemon, the other with vanilla. The lemon was harmless, while a teaspoonful of the other caused vomiting and purging. It was proved that the vanilla was not the poisonous agent. The explanation of the difference was found in the fact that the vanilla custard stood for two hours in a very filthy room, with the air in a most polluted condition, while the lemon had not done so.

Another illustration is found in the cases at Carlisle, reported by Barnes in 1886. In these cases the germs did not originate in any specific disease, but grew in the food before it was taken into the body.

Saprophytic germs may induce disease and death in two ways.

(1.) The poison formed with milk or meat may be the sole cause. The fact that the first symptoms do not appear until many hours after the food is taken does not absolutely disprove this.

(*b*) A germ may grow in the intestines and still be an obligate saprophyte. A germ which will grow in a certain medium in a culture flask, and produce a poison, may grow on the same medium in the intestines and produce the same poison.

(*c*) Some of the germs may have the power of living for a short time in a parasitic manner.

(*d*) The toxicological properties of these bacteria are also influenced largely by the conditions under which they develop, such as temperature, amount of oxygen supply, etc.

The infection of milk is one of the most serious questions which can interest the student in public health, as it constitutes one of the most important factors in the causation of infantile mortality. A large proportion of the deaths of infants is due to diarrhœa. The attacks of diarrhœa are most prevalent among children artificially fed, and they are not due to a specific germ, but may be caused by a large number of different micro-organisms. The germs are saprophytic, and their harmful effects are due to the chemical poisons which they elaborate. Recognition of this factor in infantile diarrhœa has led to the use of sterilised milk, and though a lessened death-rate has followed, the total result is disappointing. The failure is due to the following reasons: 1st, The process is difficult, and as often attempted is not accomplished; 2nd, even when efficient there is no evidence that the chemical poison is destroyed; 3rd, the food is often re-infected in the alimentary canal of the child.

It would be best, if milk which had never been infected could be obtained. I am also satisfied that in the feeding of a child suffering from summer diarrhœa it is better to wholly withhold milk for some days, than to give sterilised milk, because the latter immediately becomes re-infected in the stomach and intestines. I cannot close without emphasising the importance of the work which those who are called upon to investigate cases of food poisoning must do. The method of procedure should be both chemical and bacteriological. A complete and thorough search for inorganic poisons should be made. The germs found should be grown under conditions as nearly identical with those under which the suspected food has existed or can be obtained. Tests should be made not only for the basic product of putrefaction, but for the bacterial products as well. Physiological tests upon lower animals should never be neglected.

In the discussion the first to speak was Professor BLANCHARD.

Professor R. BLANCHARD, of Paris, said: I desire to say a few words on poisoning from ingestion of meat. This poisoning is designated collectively *botulisme*, and it does not appear that under this name is comprised accidents which essentially differ as to their original cause. By the word *botulisme*, from the Latin *botulus*, a sausage, is essentially understood poisoning consecutive to the ingestion of bad or putrid sausages. The word *botulisme* has generally the wide meaning of poisoning from any kind of meat. Putrefaction of meat, we all know, is due to microbes. These invade the meat, are nourished by it, and multiply therein, producing at the same time chemical substances called ptomaines, most of which are intensely poisonous. But there exists a large number of animals whose flesh is normally toxic, quite irrespective of putrefaction or disease. Without speaking of certain fish, in the blood of which has been discovered a substance named "ichthyotoxine," I would confine myself to the poisoning produced by certain fish in the Cuban Sea (Meletta venenosa), or from the Japanese Sea (Diodon cetdrodon). In the meletta it appears that the poisonous principle resides in the muscles. As for the plectograths so-called of Japan, it appears from the researches of my colleague, M. Remy, that the poison resides exclusively in the glands, which are in a state of physiological sub-activity. In the one case as in the other, the chemical substance is produced entirely from the physiological activity of the animal tissues, and poisoning is due to the ingestion of leucomaines. Thus there are two very distinct categories of poisoning by animal flesh. (1) *Botulisme* is meat poisoning produced by microbes in which the latter have elaborated ptomaines. (2) Poisoning from fresh meat, which is caused by leucomaines produced by physiological activity.

Professor **Brown** complimented Dr. Vaughan upon his paper, and desired to refer to some of the points prominently brought forward. He stated that it was evidently quite clear that there were microbes having no special morphological structure, which might undergo various changes under cultivation, and which produced unanticipated effects. The bacteriologist was at present somewhat hampered in regard to his cultivating medium. It was well known that some organisms would only grow in the presence of air, and others refused to grow under such conditions. It was a question whether some of these diseases were due to organisms at all. He agreed that everything connected with bacteriology was at present in a most unsatisfactory position. Whilst doubting the practicability of Dr. Vaughan's suggestion that every cheesemaker should employ a bacteriologist, he thought something should be done in this direction, in order that they might be relieved from the present unhappy condition of things. Whilst there were some dairies which were model institutions, the ordinary surroundings of the dairy in the typical dairy district were most filthy, and the emanations from such dairies could be felt, or at any rate smelt. It was a disgrace that dairy products should be collected under such unsatisfactory conditions, and he agreed with Dr. Vaughan in his suggestions that something should be done to relieve them from this state of things, in a country which pretended to take an interest in sanitary science.

Mr. **Fleming**, F.R.C.V.S., said Professor Blanchard had shown in a remarkably lucid and interesting manner the source of production of physiological and pathological materials which are considered dangerous in certain foods, and Drs. Ballard's and Vaughan's statements corroborated what has been often reported. The conditions under which dairies are kept and cheese is made were also points about which there could be no doubt as to their being in many cases most unfavourable. But were the conditions under which flesh was prepared in the slaughter-houses of only too many towns any more favourable? They were often filthy in the extreme; and even if they were otherwise, the localities in which they are situated are most foul. In discussing the question of meat infection, this fact should not be lost sight of. The subject was a most important one, and its discussion should have some practical results. The natural history of the pathogenic organisms is now advanced to a stage upon which some conclusions should be arrived at with regard to preventing their malignant operation. These contemptibly minute organisms were infinitely potent for mischief, and though it was necessary to study thoroughly their nature, it was still more necessary to know how to prevent their action. How was food to be protected from the changes induced by such organisms—flesh and milk, and canned food? Sanitarians should deal with this practical aspects of the matter, as the public will expect to be safeguarded from danger.

Dr. **Klein**, F.R.S., read the paper on "Infectious Udder Diseases of the Cow in Relation to Epidemic Diseases in the Human Subject." This paper, together with the interesting discussion it gave rise to, must be held over for want of space.

SECTION IV.—INFANCY, CHILDHOOD, AND SCHOOL LIFE.

At the second day's sitting the President, Mr. J. R. **Diggle**, read the presidential address, Dr. Jacobi, of New York, being in the chair meanwhile. At the commencement of the business, however, a communication was read from the Hull School Board with reference to the subjects proposed to be discussed at this Conference, and enclosing a resolution unanimously adopted by the School Board to the effect that while the sanitation of public elementary schools had been much improved, a large number of private adventure schools existed in which bad sanitation prevailed, and rendered it desirable that steps should be taken by the Congress with the view of placing such schools under some efficient system of inspection. The resolution was put to the meeting and carried *nem. con.*, after which Professor **Gladstone** took the chair.

Presidential Address.

[Mr. Joseph R. Diggle, M.A., Chairman of the London School Board.

We have met, from all parts of the world, to take counsel together of the things which pertain to the well-being of the State. It is natural, therefore, that all that makes for the welfare of the children should come under our purview. Not that the children are less under the charge of their parents because they form a principal care of the State; but that the collective ripened experience of the community may be an assistance to the individual guardian of the child.

Care for all children as children, and not for the apparently strong and useful of their number, is the outcome of Christian civilisation. We do not look upon them merely as the means of perpetuating the human race. In the weakest and frailest among them we discern the latent capacity for a higher life; and precisely because in their case the physical organism hides rather than exhibits the true child, the duty is more clearly laid upon us of assisting the child to break through the barrier of hostile physical defects. In the performance of that duty the State has learnt to place a right value upon even imperfect human life, and the laws of Christian communities increasingly reflect in that regard the common sentiment of their peoples. It may be that one of the chief abiding results of this International Congress will be to quicken into active thought for these things any national conscience now lying dormant.

The broadest measure of the State estimation of child life is the care which the State bestows upon the education of children. Involved in the very idea of education is the perception of the innate capacity of the child for larger development. And this capacity varies with each child. Children are as alike and as diverse from each other as the leaves of the forest trees. Whilst we think of children, and care for them, collectively in large numbers, we must beware lest we lose in this collective dealing with them our grip of the individual characteristics of each child.

It is at this point that the danger of confounding education with teaching comes in. Our habit is to speak of the one thing as if it were the equivalent of the other. They are rather the complement of each other. Acting in unison they are allied forces carrying into effect a common plan; acting apart from each other they are like foes encamping upon a common ground. Let us therefore at the outset firmly grasp this principle, that teaching may often in no way mean education, and that the teacher may sometimes be educating in a manner directly opposed to his teaching. An educator, as apart from a teacher only, is one who has large sympathies with the children, and understands the higher possibilities of their nature. His function is to help the child to feel his way about the world, to understand something of the things he meets with, and to throw the light of a riper experience upon the path which opens before him. The ideal is a lofty one, but it is not incapable of general attainment; and the pressing need of the time is to raise teachers to the height of educators, and teaching to the level of education.

No successful work therefore can be performed with children unless there be first of all a thorough appreciation of the value of the material with which we work. It is an obvious truth, but, like many other things equally obvious, it is frequently overlooked. There are thousands amongst us who are keenly alive to the importance of training for dogs, or horses, or cattle, who would practically allow the children to grow up anyhow. And the parents are not few who would throw upon the State the responsibility which nature has imposed upon them of caring for their own offspring.

Perhaps the most difficult of all social problems arises here. The value of child life to the State is not less because surrounding the child there may be the vicious influences of parental neglect. Take, for example, the much-debated subject of providing for destitute children, and for the children perhaps more destitute still in fact, though not in the eyes of the law, without at the same time loosening the tie of parental responsibility, and weakening the force of its obligation. The immediate solution of the problem surely depends upon the point of view from which it is regarded. Some think that the immediate thing to be done is to safeguard what appear to be the general interests of the State. Others think that the immediate thing to be done is at once to succour the child. One path travels down from the State to the child; the other travels up from the child to the State. Believing as I do in the untold value of child life to every State, I infinitely prefer the second mode of dealing with the problem. Without in the least hindering every effort to reform bad parents, the most hopeful course in the interests of the State appears to me to be the training up of children to be strong and good. What I would once more enter a protest against is the plan of leaving the child to act as a sort of buffer between the engine of the State and stolid inert mass of parental neglect.

For, in truth, the necessity for State interference at all in the up-bringing of children arises from some form or other of parental neglect, coupled with the advantages which the complete organisation of the State offers as a means of co-operating with good parents in the performance of a natural duty. In theory the whole duty lies with the parent; but the advantages of co-operation become apparent in the employment of a teacher, in the use of a school as a common home, and still more in the general supervision which the State exercises in order to ensure that both teacher and school are adequate for their purpose. In all cases, to some extent, the State interferes. The moot point is in what aspect the interference shall be regarded. Are we to look upon it as the natural and permanent attitude of the State, or as a temporary and makeshift provision for a pressing need until a better ideal can be attained? Which point of view affords the best outlook for the future? That the State should think for all and not act for all, or that State powers should be strictly limited to their narrowest extent, and the fullest possible play should be given to individual responsibility and action? Shall we look upon children as being primarily the children of the State, or of each separate home? Working, as I do, along the path which leads from the child to the State, between the child and the school I find the home. Is the action of the State to touch the internal economy of the home? Would it be well for the home that the action of State interference should be perceptible there? And if not well for the home, is it well for the child?

Whatever may be the outcome of the future, it is clear that some sort of State interference is a necessity for the present. The exigencies of our modern civilisation, not less in our crowded cities than in our thinly-peopled villages, invite the intervention of the State in the interests of the general community. The influence of law surrounds and presses upon us like a social atmosphere. Our main business is to take due precautions that the intervention of the State where it occurs shall proceed upon right lines, and in directions where experience indicates that success will attend upon it.

Thus the healthiness of the schoolroom; the suitability of its arrangements and of its surroundings for the purposes of a school; its appointments for the purposes of teaching, are all matters of vital importance to the whole of the community who make use of it. In what manner these things can best be secured the papers and discussions of this Congress may help to point out with clearness and fulness.

Again, the entire range of the teaching which is intended for the development of the whole child concerns the community still more than the general suitability of schoolrooms as places where teaching is given. Not a part only, but the whole of child's nature demands separate care. Unless the community makes this, too, a matter of the deepest concern, it is destroying a part of its natural wealth. At times there has been a tendency to make the range of teaching coincide too much with the knowledge of books and too little with the experience of natural things. The culture of physical powers has been neglected, with a consequent loss of physical strength and of graceful bearing. Two much learning from books apart from the things themselves has led to a weakening of the faculty of observation, and to a loss of the aptitude for independent reasoning from observation and experience combined. Too little care for the spiritual capacity of the child has blunted the moral perception and retarded perfect intellectual development. Stunted or perverted ideas upon these cardinal principles, when they take the form of State laws, can only be administered at the loss of the community. From our deliberations here, where the widest freedom of utterance prevails, it is no small consolation to think that many will strike the one note which may harmonise many discords when insisting that the importance of developing the entire physical, intellectual, and spiritual capacities of children far transcends the minor matters which create divisions amongst us.

In this spirit we welcome those who, from other lands than our own, are assisting in the work of this section. We have a common aim, and we work in a common cause. As of old we look for a "city of truth," in which "there shall yet dwell old men and women, every man with his staff in his hand for very age." "And the streets of the city shall be full of boys and girls playing in the streets thereof." Among our "national manufactures" we think with Ruskin, that "that of souls of a good quality" will "at last turn out a quite leadingly lucrative one." Some words of his I leave with you to inspire the work of this section: "In some far away and yet undreamt of hour," he says, "I can even imagine that England may cast all thoughts of possessive wealth back to the barbaric nations among whom they first arose; and that while the sands o the Indus and adamant of Golconda, may yet stiffen the housings of the charger, and flash from the turban of the slave, she, as a Christian mother, may at last attain to the virtues and treasures of a heathen one, and be able to lead forth her sons, saying: 'These are my jewels.'"

Dr. Leo Burgerstein then read his paper on

The Working Curve of an Hour.

It is the experience of every teacher that one hour's steady work with children, even though the subject be an interesting one, produces in them a certain amount of fatigue. To demonstrate the fluctuation of brain-power in children, during one hour's occupation with a familiar subject, simple addition and multiplication sums were given. The figures were printed and constantly varied. There were two classes of girls, containing respectively 35 and 33 children of an average age of 11 years and 11 years and 10 months, and two classes of boys, containing 44 and 50 children of the average age of 12 years and 2 months and 13 years and 1 month. After 10 minutes work the sums were taken away from the children; then there was a pause for five minutes, and afterwards they were made to resume work for ten minutes. This alternation was continued for one hour, so that there were four periods of work each lasting ten minutes, with pauses of five minutes between them. During the whole experiment the 162 children worked out 135,019 figures, making 6,504 mistakes. The errors in calculation which occurred in succeeding periods of ten minutes are given in a tabular form; and it was found that the increase in the number of mistakes far exceeded the increase in the number of figures calculated. The total number of calculations made by all the children increased, roughly speaking, 4,000, 3,000, and 4,000 in the different periods. During the third period of ten minutes, the increase of work done was not so great as during the other periods. The number of mistakes also increased, roughly speaking, 450, 700, 350 in the different periods. Here, again, during the third period, the quality of the work was at its lowest. It would appear then from the above that children of the ages stated become fatigued in three-quarters of an hour; that the organic material is gradually exhausted; that the power of work gradually diminishes to a certain point during the third quarter of the hour, returning with renewed force in the fourth quarter of the hour. This experiment seems to demonstrate that continuous work for school children of these ages, even though the tasks are not difficult, should not last longer than three quarters of an hour; taking into consideration also the unsatisfactory hygienic conditions under which education is conducted in the greater proportion of schools, with the exception, perhaps, of the higher class of English schools, the following resolutions are proposed:—1st. It is desirable that the question of mental over-pressure should be investigated by exact experimental methods. 2nd. That until the question of over-pressure has been carefully investigated in a proper scientific spirit, school lessons generally should not last longer than three-quarters of an hour.

Then followed a paper (in French) on "School Hygiene," by Dr. Kuborn, of Seraing, Liège, who kept on much beyond his allotted time; and Mr. Arbuthnot Lane's paper on "Some of the Causes which Regulate the Growth of the Child." In the discussion on the papers Dr. Gladstone said that they must congratulate themselves on having such papers read before themselves. In order to make the best progress in the teaching of children it is important that we should have all the information which these lecturers can give us on the subject, and our best thanks are due to them. We know that in Dr. Burgerstein's own country the lessons always last an hour, and the terms "lesson" and "hour" are synonymous. If we consider the effect of work upon the mind of the child we find that it can be expressed in a curve so as to go right home to the mind of the educationalist. These examples of Dr. Burgerstein did not properly represent the ordinary lessons of a child, as in the case of these experiments the lessons were separated by an interval of five minutes between them, which is not the case in schools. He would like to see this subject carried on further, when they would find that the remarks of the speaker would be substantiated. Of course, the children of the poor could not expect to do so well as the children who were better nourished, and we should find that there would be a difference between different nations in this respect. When he was a student in Germany he found that most of the German students there could study more hours a-day than he could, or than his countrymen could do. He quite agreed that lessons should not be longer than three-quarters of an hour at a time, and in many cases this is so in this country. With regard to Dr. Kuborn's paper, he remarked that he (Dr. K.) had given them another instance of how they can examine one of these questions of education, and of the length of time the brain takes to develop, and also the great conclusion that they should not allow this development to go on too fast, but should prolong the time during which it is allowed to go on. As to Mr. Arbuthnot Lane's paper, they had had a demonstration as to the effect of external causes on the bones, and if there were so many causes which affected the osseous system, they would very well expect that the brain would be very much affected by the amount and nature of the studies.

Mons. Féret, in the course of his remarks, which were in French, showed some adjustable desks and seats, which could be made the proper height for any scholar.

Dr. Kotelmann also spoke, in German.

The President put to the meeting the resolutions printed above. The first one was carried unanimously, the second with one exception.

The table being removed, and the President and other officers dispersing among the members, a paper was read by George White, Esq., Chairman of the Physical Education Sub-Committee London School Board, "On Physical Education." The paper was capitally illustrated by the children of the Montem Street Board School, under the command of Miss Harrison, who won the banner in the competition in the Albert Hall two years ago, and from what they did at this meeting we should say they well deserved the honour.

George White, Esq., B.A., LL.B., Chairman of the Committee on Physical Education of the School Board for London, then read the following paper on

Physical Education.

The subject of Physical Education, especially in elementary schools, is one which, within the last few years, has attracted much greater attention than formerly; and this increased attention is one, among many other phenomena, indicative of the change which in the last decade the meaning of the word education has undergone. For, whereas in days gone by education meant the cramming or acquiring of a given quantity of mere information, it now has a much more extensive and developed meaning, both as to what it connotes and what it denotes. At last educationists are beginning to realize the natural interdependence of bodily and mental functions, and the consequent necessity of creating perfect physiological and psychological conditions in order to conduce to the harmonious working of the various parts of the human system and its functions, and to produce the maximum of result with the minimum of effort; or in other words that the educational efforts of the individual should be attended with the maximum of pleasure and the minimum of pain.

The Education Department has lately given an impetus to this greater attention by introducing into its Code an article which recognises the utility of apportioning some portion of the school time to instruction in some form of physical education by allowing such instruction to be included in the ordinary time-table of the school. Art. 12

(*f*) of the Code of Regulations in 1891, for the first time, provides that "in making up the minimum time constituting an attendance may be reckoned time occupied by instruction in suitable physical exercises and military drill."

And such bodies as the National Physical Recreation Society, the German Gymnastic Society, the Swedish Gymnastic Society, and other organisations of that kind, with their consequent rivalries, are similar indications of a wave of thought passing over the country in favour of attention being given in various ways to physical as distinct from intellectual development.

The term Physical Education used as denoting a subject for school instruction has not such a wide meaning as when used generally. Its object in the former sense being partly to secure the best conditions for mental effort by promoting the best physical conditions, it includes such instruction as leads to uniform and harmonious development of the whole body of the individual child, with due regard to his physical idiosyncrasies, or any accidental or abnormal characteristics which may differentiate him from an ordinary generic child living under normal conditions.

A number of prettily-dressed children now took part in some exercises to show development of each part of the body, conducted by Miss Harrison.

It does not include such specific or extraordinary exercise and education as leads to the powerful arms and shoulders of the rower, legs of the runner, body of the pugilist, or the mighty physique of the professional athlete, nor anything that develops acrobatic aptitudes. Its limits, therefore, with respect to the school, and the conditions for its healthy prosecution, can be easily defined and formulated.

One of the greatest difficulties that a teacher has to deal with in the management of young pupils is the desire for change, and the natural predisposition to physical activity which always accompany infancy and early youth. The skilful teacher is he who knows how to utilise these most advantageously to make the school life of his pupil happy and interesting. The time selected for physical exercises should not be so close to the time for meals as to create any undue strain or any antagonism between the physical functions involved in digestion and those concerned in mere physical exercises as such, nor so placed in the time-table as to cause any antagonism between physical and cerebral functions. Probably a period midway in the time apportioned to mental subjects would be the best to allot to them. And inasmuch as practice and instruction in such exercises as can be taught to pupils between five and fourteen involve a certain amount of free movement for all parts of the body and necessitate standing in a more or less erect posture, it would be best to arrange it in some part of the time-table preceded and followed by lessons which require sitting, otherwise weariness, lassitude, and undue strain and effort would result. It need hardly be pointed out that healthy prosecution of physical education requires the best atmospheric surroundings. A lesson on physical exercises ought if possible to be given in the pure open air, of course with proper regard to temperature. A large shed in the school playground would be useful for the purpose; or if not a large hall in the school itself. The structure of a school therefore cannot be said to be perfect unless it includes one of three things:—

(*a*) A large shed, open at the sides, in the playground; or:—

(*b*) A hall in the school, well lighted and ventilated, to which each class can be drafted in turn; or:—

(*c*) Plenty of floor space in each class-room, unencumbered by desks, well lighted and ventilated. This latter, however, which is suggested as an undesirable alternative, when there is no other, makes it almost impossible for any exercises involving marching or change of position to be practised.

Apart from its mere general hygienic results, the advantages attendant upon the teaching of physical exercises as a school subject are manifold. As a great mechanical help to school discipline it is invaluable, partly on account of the habits of ready obedience and attention to the commands and wishes of the teacher which it engenders, and partly as affording the means of securing a variety of posture and attitude to satisfy the demands of that vitality and activity, which the young under natural conditions, always exhibit.

Exhibition of Exercises to illustrate these by the same Children.

The indirect effects it has are equally inestimable. Its aim, and result too, if properly taught, being to make children healthy and well developed, exercising in turn each separate part and function of the human body, it powerfully counteracts any hereditary predispositions to disease which may be present, and minimises their injurious tendencies. This can perhaps best be illustrated by a series of exercises designed for the expansion of the chest and shoulders. Their hygienic effect must be at once obvious.

Exhibition of exercises designed for development of chest by the same children.

The object of teaching physical exercises in schools being partly to secure rest and diversion from intellectual toil and partly to make children healthy and to secure the maximum of their bodily development, it seems that they cannot be taught at too early a period in the school age, which is taken for practical purposes, as mentioned before, to be from five to fourteen. In the infants' school, exercises simple in character, but designed to afford development in turn to each part of the body, should be taught. Here, if at all, appears to be the only place where musical accompaniment to the exercises is desirable. For very young children such accompaniment may help towards precision of movement, and the rhythmical sounds and the pleasure resulting from sweet melodies or harmonies may add to the recreative character of the lesson. In schools for older boys and girls, however, it is doubtful, I think, whether such musical accompaniment is necessary or desirable. There certainly cannot be two opinions as to the undesirability of allowing children to whistle and sing their own accompaniment, which I understand to be the practice with some systems, while practising physical exercises. In girls' schools a little reform in the matter of dress is requisite for the healthy performance of such exercises as ought to be taught. Without going into details, each part of the girl's dress should be so arranged as to allow of free unconstrained movement of the muscles and the limbs. Probably the kind of exercises taught to boys at school ought not to vary greatly from that taught to girls. The main object with girls, however, is to secure regular development and harmony of form, while with boys, this is a secondary object to the promotion and general diffusion of muscular strength and to their proper equipment to discharge their duties as useful citizens. In the highest classes then physical exercises may be localised and specialised with respect to their future and prospective callings. The average physique and stamina of a boy being greater than that of a girl, probably the exercises may be of a little more violent nature, and practised for a longer period than in the case of girls. Military drill ought undoubtedly to supplement the ordinary physical exercises for boys. It teaches them to walk in a regular step and manner better than any other form of physical exercises; accustoms them to grouping and forming ordered masses, and indirectly shows them the value of co-operation, and the necessity and advantages of discipline.

It will be gathered from the foregoing remarks that a typical lesson on physical exercises should embrace one or more movements for each part of the body, first of a simple character, and then graduated up to more difficult and complicated ones. The length of time necessary and desirable should be sufficient to afford recreation and relief from the intellectual labour involved in the lessons preceding and following, but should not be so long as to produce weariness and fatigue, which may be as injurious as indigestion. Individually weak pupils may, therefore, require special attention. But what should be aimed at is that there should be proper moderation and frequent repetition of the exercises. The aim and object of the exercise should, so far as the pupil is capable of understanding them, be taught with each exercise; and for this purpose a technical and scientific knowledge of physiology and anatomy is required on the part of the teacher.

Here the Children gave a Practical Illustration of the Lecturer's Meaning.

In the training of teachers, therefore, for instructors in physical exercises, there should be careful study of the human frame—of the different systems which go to make up its structure, their interdependence and intro-action one upon another. With each branch of theory there should be its practical application to physical education and physical exercises. When, for example, the physiology, anatomy, and functions of the leg are being studied, particular exercises designed to develop the leg and make the performance of its functions easy and natural should be practised.

Here an Exhibition of Exercises in Leg Movements was given.

In the Swedish system of exercises, which probably has been elaborated more than any other, there are different systems devoted to—

1. Pedagogic gymnastics.
2. Military gymnastics.
3. Medical gymnastics.

In each branch the exercises are selected and their order formulated to promote the immediate object in view, physiological and anatomical research and study forming the basis, and the theory and practice being taught side by side, whichever course is undergone.

The physical exercises or gymnastics suitable for the school are of course different from those practicable for the period of adolescence or for the adult. Exercises with apparatus more or less involve severe strain, and this severe muscular effort may seriously affect the development of the young subject, and may lead in some cases to the ossification of the epiphyses. On many other grounds, too many to be here given and explained, the use of apparatus by children at school is to be deprecated, the aim with regard to them being "not at localising the muscular effort over a limited region, but, on the contrary, to generalise it by distributing it over a large number of muscles at the same time—not to induce fatigue quickly, but rather to bring all the functions into greater activity." As to the mechanical adjunct of musical accompaniment, it no doubt adds an element of recreation and pleasure to the exercises, especially to young children, but for reasons indicated above, for elementary schools especially, it is doubtful whether it should be insisted upon for older children.

The evils consequent upon the absence of a systematic and universal provision for instruction in physical exercises are no doubt minimised, and have been prevented from obtruding themselves on public attention, by the practical outcome of that desire for activity and natural necessity for exercise which every healthy human being, whether youth or adult, instinctively and spontaneously feels impelled to, in the shape of games and sport. Any organised system of physical exercises should be used as a supplement, and not as a substitute, for games. On the other hand, many games may be utilised so as to afford subject matter for the practical application of the elements taught in physical exercises. One of the best of such practical applications is swimming, the movements in which bring into action perhaps more of the muscles of the body than any other form of exercise. Its value, therefore, estimated as a subject of school instruction, and as a part of physical education, apart from the skill and bodily dexterity which it involves, and the material advantage resulting therefrom, seems to me to be immeasurable. It affords a kind of counterpart of physical education on land; and no child can be said to have a complete physical education until it has been taught how properly to use its limbs, and how to exercise all its muscles, both in the water and out of it. No school, therefore, can be said to have its educational machinery complete unless it includes in it, ample accommodation for the teaching of all its children how to swim. The London School Board has lately recognised this by resolving, wherever proper public bath accommodation available for the purpose of instruction in swimming is not provided, to build in its new school swimming baths, in order that all the boys and girls attending its schools may have their education complete in this particular. But much has yet to be done to secure that physical education should be more general than it is. Its aim in school is hygienic and not to promote skill; and if the discussion of it and its value from this hygienic point of view by this Congress leads to an education of public opinion in this country in its favour, much will have been done to secure its recognition as a proper subject in every school curriculum throughout the land, and to remove from us the reproach which we are justly liable to, of being far behind other countries in the absence of proper attention being given in our schools to this important subject.

Here an Exhibition of General Exercises was again given by the Children present.

At the close of Mr. White's paper and demonstration by the children,

The PRESIDENT submitted to the meeting a hearty vote of thanks to Miss Harrison (one of the teachers) and the scholars of the Montem Street Board School for giving the excellent demonstration and showing the kind of physical training which is given in London and throughout a very large number of public elementary schools in the length and breadth of England.

Mr. BRONAN then read a paper on "Physical Exercise."

DISCUSSION ON THE FOREGOING PAPERS.

Lord MEATH said that the British public, and especially the inhabitants of London, owed to the president and lecturers the most sincere thanks for having introduced into their Board schools in London the systems of physical exercise. For many years he, in common with many others, had felt that the children of large cities needed some kind of physical exercise. Statistics are very hard to get on these subjects, but it is only necessary to go into the big cities and to use one's eyes, and they would find the children of these cities are very much degenerated—he cared not what anybody said to the contrary, he was certain of it. He had been asked some time back to witness an exhibition of military drill by the children of the London Board Schools. He had left the exhibition somewhat sad, because the children in these schools were decidedly inferior to the children in country schools in physical capacity. He himself had then issued a circular to the schools of all the towns of over 15,000 inhabitants, asking them to inform him what—if any—were the physical exercises they taught, and only half of them had any physical exercise whatever. His limits were very wide, as he included under the term "Physical Exercise" anything which could possibly be introduced, even such movements as exercising between the desks. This was a very sad state of things, and he hoped that before long steps would be taken to introduce physical exercises into all schools. He had introduced a Bill into the House of Lords which was at present under consideration, the object of which was to persuade (in this country we are not favourable to compulsion) Board

Schools to have some physical exercise by rendering any school unable to obtain the higher of the two Government grants unless it had such physical exercise, and he hoped that all who had influence in that direction would do what they could to help him and others in this great pursuit. He had visited the schools in other lands, and the only point on which he would differ from Mr. White is whether it is quite wise in saying that the use of apparatus is wrong. In Germany it is used, and Swedish drill is now carried on with its use. And it should be so, as children who are unable to use apparatus are unfit for any sort of physical exercise at all. The teachers of the school should always be the teachers of the physical exercise, it being a great mistake to have outside drill sergeants to drill the children. Teachers in Sweden have to undergo a very severe examination before they are allowed to teach these subjects. In Saxony the teacher has to write an essay on the teaching, and on elementary anatomy and physiology, and to show a practical knowledge of teaching by personal performances and by instructing a class. Military drill is an excellent thing, but it will not develop the muscles nearly so well as military drill combined with gymnastics. Swimming is one of the most useful forms of exercise, bringing into exercise nearly all the muscles of the body, but with respect to this, is it going to be taught in winter as well as in summer? If not the bath should be fitted up as a gymnasium in the winter as is done in the Paddington baths.

Mr. Noble Smith said he would like to see the abolition of out of school work, and he would like to put it forward as a proposition, he should also propose that ample physical recreation should be carried out in all cases. Dr. Bronan had said that the exercises were not introduced for the purpose of providing amusement for the children, and he had nothing to say to that if they were taught as a part of their education and not as a part of their play; and as there was a physiological law that an over-worked part degenerated instead of developing, rest should follow after exercise, and he would like to propose those statements as resolutions. (Hear, hear, and applause.)

Dr. Brown, of New Zealand, said he had great pleasure in supporting particularly the first of the resolutions. He found that the new code advised examiners to do away with individual examination and to abolish home-work. Long-continued work is fatal to efficiency, and if this is so at school, under the eye of the master, it must be more so at home, where the work was often done in badly ventilated rooms. (Hear, hear.)

Dr. Bergerstein said he had made the pauses of five minutes between the exercises in order to make them resemble school exercises, which were often interrupted by the master, changing of lessons, &c.

Professor F. C. Robinson, of Maine, U.S.A., Board of Health, said he had come from the States in order to take back a report of this question, which is exciting great interest there. In Massachusetts, if a school-room is not sufficiently ventilated, three or four citizens may complain to the State Board of Health, who will make the town put it in good order at its own expense. In the States they didn't believe in compulsion any more than we do here, but they draw the line at schools, considering them to be the foundations of citizenship. The Swedish system is compulsory in Massachusetts and Boston, and the results are very satisfactory.

The President then put the resolution to the meeting, (1) "All out of school work should be abolished."

Sir Philip Magnus thought it would be advisable to qualify that resolution, for to make it so strong would be to stultify the members of the Congress.

A gentleman, whose name was not given to our representative, proposed as an amendment "that the hours of home work be restricted."

This amendment was seconded by Sir Philip Magnus.

Mr. N. Smith would like to oppose the motion entirely and let the original resolution stand.

Professor Gladstone supported the general principles, and proposed the words "abolished or restricted," but the amendment was carried by 37 to 20 votes against.

The motion as amended was carried by a large majority.

The second resolution, "That ample physical recreation be carried out," was carried *nem. con.*

On the third resolution, "That long walks be abolished,"—(laughter),

Dr. Chapman moved as an amendment that the words "accompanied by excessive fatigue" be added.

A lady here asked to be informed what was meant exactly by the resolution and amendment.

Mr. N. Smith would explain, but was ruled out of order by the president; and the amendment, having no seconder, dropped.

Votes for the motion, 7; against, 13. Motion lost.

The fourth resolution, "That in the interval between the exercises the body should be properly rested," was carried unanimously, and with loud applause.

Dr. Schofield's paper was read on "The Value of Hygiene to Women." At the close of Dr. Schofield's paper he proposed "That this Congress hereby warmly advocates the instruction of girls and women in personal and domestic hygiene as an integral part of their education," which was seconded by Dr. Foster, and carried unanimously.

A paper was read by Sir Philip Magnus on "Manual Training in its Relation to Health," Dr. J. Brown, of New Zealand, in the chair.

On this paper

Dr. W. Brown remarked that it has been said that the tendency of modern elementary school life is to turn the boys into clerks and the girls into sempstresses or shopkeepers, and they all knew how habits acquired during school life became stereotyped on them, and if the introduction of these exercises does nothing more than alter the ambition of the school children, it will do a great deal indeed.

Dr. Deshayes, of Rouen, then read his paper on "The Hygiene of the New-born Child."

Then the President thanked the members for enabling him to bring the whole of the proceedings within the space of time allotted to them. He wished to remark that in the Liverpool School of Cookery and Laundry Work one part of the scheme is the introduction of a series of physical exercises, with singing to make a break in the proceedings.

SECTIONS V. AND VI.

Owing to extreme pressure on our space, we are compelled to defer publication of reports of the proceedings in the above sections.

SECTION VII.—ENGINEERING.

In this section a paper was read on "Water Supply" by Alex. R. Binnie, Memb. Inst. C.E., Engineer-in-Chief, London County Council.

Next followed a paper

On the Distribution of Two Waters of Different Qualities by Distinct Systems of Pipes.

By M. Bechmann, Chief Engineer of Bridges and Roads in France, etc.

The author examines the question as to whether the system of double distribution, such as has obtained in Paris since 1854, for example, should be generally adopted; and whether it is in any case desirable, or, from a hygienic standpoint permissible. He concludes: 1. That the ideal water-supply of a town consists in the uniform distribution of potable water suitable for all purposes; 2. that should particular exigencies necessitate the expedient of a double service supplying two waters of different qualities, only one of these being potable, the double service must not be introduced into private houses, where potable water only should be at the command of the consumer.

Next followed a paper on the

SEPARATE WATER SUPPLY FOR DOMESTIC AND SANITARY PURPOSES AT SOUTHAMPTON.

By Wm. Matthews, Mem. Inst. C.E., F.G.S.

Description of water supply of Southampton previous to 1852. Failure of attempt to obtain water from the chalk by boring to a depth of over 1,300 feet at a cost of £20,000. The supply from the river Itchen introduced in 1852. Entirely new works established in 1888, drawing a supply from wells sunk in the chalk eight miles away, and delivering into reservoirs (made in 1852) on the common at a level of 160 feet above the town. In 1888 it became necessary to renew the trunk main from the high level reservoirs as well as many other pipe lines in the town; and as the water was all running to waste, it occurred to the author to establish a second supply for sanitary purposes, making use of the old pipe lines and the low-level reservoirs. A large portion of the town now has a separate supply, for sanitary purposes, of water which costs nothing for pumping, and a consequent saving is effected in the pumping and softening of the domestic supply. As the renewal of mains becomes necessary, so the dual supply is extended by allowing the old pipe lines to remain in and connecting them to the secondary system. In dry weather the drainage from the common is inadequate for the sanitary supply, and is augmented by pumping from the deep well to the extent of nearly 100,000 gallons per day. Pumping is effected by means of a pair of hydraulic engines driving a set of well pumps. Power is derived from the high pressure main to the town where it passes near the well. The water is conveyed to and from the engines by a by-pass fitted with valves; admitted at a pressure of 20 lbs. to the square inch, it works the engines and is exhausted through the by-pass into the main at a pressure of 5 lbs., the only effect being that the head of water in the trunk main is lowered by the difference of 20 lbs. — by 5 lbs. = 15 lbs., and no water is lost. The secondary supply is used exclusively for public sanitary purposes, and no service pipes or other house connections with the system are permitted to be made.

Professor Robinson holds very strongly that certain organisms are not removed by filtrations through sand, but thinks that this section ought not to be an alarmist, as a number of people are obliged to drink more or less polluted water. He, however, did not think that it ought to go forth that the low death-rate of London was due to the using the polluted water of the Thames, and strongly recommended that all the water should be filtered. He then strongly condemned the use of the intermittent systems. As regards the duplicate supply of towns whilst acknowledging the use in some towns, he yet does not think that it is practicable.

Dr. Frankland said: We are all agreed that the supply of pure water is of the highest importance in a sanitary point of view. Sewer gas, which some years ago was condemned as carrying nearly all the infectious disease, is now getting less and less guilt attached to it. Infections, being now known to be solid, cannot be conveyed, or only in very exceptional cases, in the sewer gas. It is very different if the gas bubble through the water, when it forms, as it were, miniature balloons, and if any infectious matter is present it is carried into the air. Dr. Frankland then instanced a very interesting outbreak of typhoid fever. The excreta of a man suffering from typhoid was proved to have entered into the stream of a valley, and this was proved to have infected a stream two miles distant and apparently in no way connected with the first stream. Experiments were made, a large quantity of salt was dissolved in the first stream, in a very short time the amount of chlorine rose in the second stream. A quantity of fine flour was mixed with the water of stream No. 1, this, however, did not pass through to stream No. 2. Dr. Frankland then spoke of the purification of water, and stated that he knew of no system of purification that can be absolutely relied upon except boiling, and this was not applicable on a large scale. He then alluded to the dual supply of towns, but was of an opinion that it was not necessary in England, and that it would be a source of danger.

Mr. Baldwin Latham did not dispute the facts in Mr. Binnie's paper, and although he advocated the use of the purest supply, did not think that a supply should be condemned because of its pollution. Underground water will carry the germs of disease for a considerable distance, and he instanced the water supply of Beverley, which is supplied by water from wells in the chalk. An attack of typhoid fever occurred in a village three miles distant. A swallow hole was discovered, and affected the supply to Beverley.

Mr. W. Kümmell said: M. Bechmann, then, considers the best system is to deliver one quality of water, but if this is not possible, to deliver to the customers the best water only in their houses. We think, in Germany, too, that this is the best way, but besides the quality also the quantity of the water is to be considered, in order to deliver what is necessary for all domestic purposes at any hour, day and night, without interruption. Now we in large towns, far distant from mountains, are not able to bring the water from the hills to the towns, for we find the ground-water very seldom in such quantity. We must have sufficient for delivery to our consumers, therefore we must take water from the one source—the river, though it be deteriorated by the sewage of many towns above our own. We have to clean the water from the river as well as we can; we filter it, but we do nearly the same what the great English engineers did many years before, because there has been hardly any alteration in the construction or working of the filters for forty years, though it is now probable that we could introduce improvements. The presence of organic matter, formerly the only criterion of the quality of a water, is at the present state of our knowledge not so important as the presence of bacteria; we know that the bacteria live on and destroy the organic materials, we consider, therefore, that high organic matter is the condition for the high number of bacteria, and vice versa. We should try to find very often and most easily the number of bacteria in the plain and the filtered water, and to compare the condition and working of our filters with their effect in diminishing the number of bacteria. If possible, we should at some time state the different sorts of bacteria. This is very important, but difficult. I hope the engineers will try to find the best way how to diminish the number and the sorts of the bacteria, and to avoid an augmentation of more than twenty-five to thirty bacteria per cubic centimetre. I think we can purify the river water, polluted by domestic drainage in such a way as to deliver a good potable and safe water.

Dr. Odling spoke in reference to the purifying power of rivers, in opposition to the views advanced by Mr. Baldwir Latham. He stated that if water was purposely polluted with sewage, and large quantities of air passed through it, the result was simply negative. Microbes are numerous, but there is little danger of harm from the microbes, as they are destroyed when placed in running waters. It is, however, different with the spores. Dr. Odling, however, is of an opinion that the human body had the power of destroying spores if not in large quantities, and he did not agree with the views taken by Dr. Franklin, that a single spore would at once commence to multiply just the same as in gelatin.

Mons. Bechmann then replied.

Mr. **Binnie**, in his reply, stated that he was of an opinion that there was not much to be gained by the dual system. He supposed that there was not two opinions in condemning the intermittent system, and strongly advocated the constant supply. With regard to filtration, sand will remove visible dirt, but it will not render water contaminated with water free from danger. He did not agree with the views taken by Mr. Baldwin Latham, and quoted instances in the Valley of the Ganges, where, on changing their water supply, the deaths from cholera were reduced from 1,200 to 177.

A paper on

The Revolving Purifier for Treatment of Potable Waters by Means of Metallic Iron

Was read by **William Anderson**, D.C.L., F.R.S., M.I.C.E.

Since the revolving purifier for the treatment of potable water is no novelty, but has been at work on a large scale at various places for some six or seven years, it is not proposed to enter into any detailed description of the apparatus, or of its mode of working. For the information, however, of those who are not acquainted with the purifier, a short account is necessary. The apparatus consists of a cylinder, supported horizontally on two hollow trunions, of which one serves for the entrance and the other for the exit of the water. The cylinder contains a certain quantity of metallic iron, in the form either of cast iron borings, or, preferably, of scrap iron, such as punchings from boiler plates. The cylinder is kept in continuous but slow rotation by any suitable means, the iron being continually lifted up and showered down through the passing water by a series of shelves or scoops fixed inside the shell of the cylinder. By this means the water, as it flows through, is brought thoroughly into contact with the charge of iron, which, in addition, by its constant motion and rubbing against itself and the sides of the cylinder, is kept always clean and active. Simple contrivances for preventing the iron from being carried out of the cylinder or piled up at the outlet end, and for distributing the current of water over the whole area of the cylinder, are also furnished, but need not be described.

The water as it leaves the cylinder appears to have undergone only one change of any importance, viz., a quantity of iron, ranging from one-tenth to one-fifth of a grain to the gallon, has been taken up, and to get rid of this the water has to be aërated either by blowing in air, or by merely allowing it to flow along a shallow open trough; in both cases repose in a settling reservoir is necessary. After a few hours—from two to six in most cases, much less in some—the greater part of the iron will have subsided to the bottom of the settling tank, usually as loose flakes of iron peroxide associated with organic matter and other impurities, and the water is then ready for filtration. In most cases a rapid passage through a shallow layer of sand is all that is required to separate the iron, which remains as a fine layer on the surface of the sand, while the water issues from the filter free from iron, greatly ameliorated as regards organic matter, and practically deprived of microbes.

The revolving purifier was invented by the author in 1884-5, to meet the difficulties which arose in the working of the "spongy-iron" filters at the Antwerp waterworks. These filters, which consisted of a mixture of "spongy iron" and gravel, choked up gradually and became almost inactive, after working for three years very satisfactorily as regards the purification of the water. They were replaced by the revolving purifiers, which have been in operation there ever since with most satisfactory results. It is not necessary in this paper to repeat the numerous details of working results at Antwerp, as they have already been made public, but it is proposed to lay before the members of the Congress results obtained on the practical scale at other places during the past year.

Boulogne-sur-Seine.—A purifier with a six-inch inlet pipe capable of dealing with 200,000 gallons of water daily, was erected last summer at the pumping station of the Compagnie Générale des Eaux at Boulogne sur-Seine. It was furnished complete with filter beds, and having worked during the autumn of 1890 remains still in operation. Very exhaustive trials and analyses were made by the Compagnie Générale des Eaux to test the system, principally with respect to the removal of bacteria, and of organic matter, as estimated by permanganate of potash. The results obtained are thoroughly satisfactory, especially as regards bacteria. The numbers determined in the autumn of 1890 are interesting, as illustrating the experimental stage of the working of the plant. During the first two periods of working, for which the average percentage reduction of organic matter is given, the charge of iron in the revolving purifier, originally rather deficient, was further reduced by solution; during the third period the charge was made up to its full weight, and kept constant by periodical additions of iron.

Average percentage reductions of organic matter estimated by permanganate of potash: 1st period, 42 per cent.; 2nd period, 40 per cent.; 3rd period, 66 per cent. The number of microbes was on the average reduced to 50 per cubic centimetre in all three periods.

The experiments with this purifier were stopped about Christmas last, and the Compagnie Général des Eaux ordered plant for dealing with the entire supply from these waterworks; but to obtain additional evidence of the efficacy of the system the six-inch machine was started again in May of this year, and the first few sets of analyses gave the results represented in the table, which show a very constant and high co-efficient of purification in very varying conditions of the river; the lowest improvement, 36 per cent., occurring the day after a heavy rain-storm which washed some rubbish into the filters.

The mean of analyses showed 63 per cent. improvement in milligrams of oxygen consumed per litre, and the microbes sank from 4,086 to 40 per cubic centimetre.

The analyses show that the satisfactory results obtained during the third period in the autumn can be considered as normal under any circumstances, and that the Compagnie Générale des Eaux may look forward with confidence to supplying a good potable water from this pumping station as soon as the permanent plant has been set to work.

Influence of Ground Water upon Health.

By **Baldwin Latham**, Mem.Inst.C.E., Mem.Inst.M.E., F.G.S., F.S.I., F.S.S., P.R.Met.Soc.

The actual measurements of the ground water in this country, in some cases, go back for a period beyond that of the registration of death, consequently a comparison can be made between the state of the ground water and the death rate of any particular period, and when such examination is made it is found that there is a coincidence between the state of the ground water and the deaths recorded. The deaths follow, as a rule, in the inverse ratio, the state of the lowest ground water; that is, *high* low water indicates a healthy period, while *low* low water marks the unhealthy periods. Investigations respecting the influence of ground water upon health should be studied over limited areas, as the distribution of rain is often very local, and there are varieties in the geological character of the soil that affect the result of observations carried on over large areas, and on this account, while observations have been carried on by the author over an extended area, he has always used local observations to compare with the mortality returns in the same district, and he has specially dealt with the records of Croydon, which is the place where the observations as to percolation, evaporation, and the hygrometric condition of the soil have been locally studied.

There is every reason to believe that the ground water itself, except when polluted, exercises no influence as a cause of disease, but it is merely the measure or indicator of the influences which are at work within a polluted soil, and of certain organic changes which evidently take place within the dark recesses of the soil, and which lead to the development of the conditions favourable to a certain class of disease. That the earth does exercise a baneful effect upon health is well-known from the experience in this country of the unhealthiness of cellar dwellings, and from the fact that persons habitually living upon ground floors are not so healthy as those living in the upper storeys of buildings removed from the influence of the ground.

There is a seasonable fluctuation in the waters in the ground, and, as a rule, these waters are lowest in the autumn and early winter, and highest in the spring or early summer, but in some years the period of both low and high water varies, as, for example, the low water of last season did not take place until February of this year (1891).

It is also known that the artificial lowering of the subsoil waters of a district has produced the same effects upon the health as occur when a general lowering of the ground water arises naturally from drought.

The actual drying of the ground is a condition which is favourable to the general good health in this country, and this circumstance often masks, in the general death-rate, the potential influence of certain diseases, so that the general health of a district appears to be good while at the time it may suffer intensely from a certain class of disease of which low ground water is the indicator. When, however, the conditions become extremely intense, and the ground water exceptionally low, the influences at work affect the death-rates as a whole. On the other hand, in periods of excessive rain with high ground water, the conditions are usually favourable to health, and all places in which the ground waters are of an uniform level, such as seaside places, which are governed by the mean tide level, and river valleys with porous soils, like that of the River Wandle, in which the water is headed up to an uniform level by mills, are usually healthy.

It is known that the measure of the effect of the ground water is most marked in districts which draw their water supply from the ground, and amongst that section of the inhabitants who use such water for dietetic and other purposes, especially in the case of young children and teetotallers.

The unhealthy time after the period of excessive low water is that when the first rain begins to percolate through the soil, just as if it washed out matters which had been specially prepared or were retained in the dark recesses of the soil, into the water, or by driving out the ground air specially charged with the poison of disease. It is by no means uncommon both in this and other countries to find that particular epidemic outbreaks which have become rife at a low-water period can be traced to particular rainfalls. In this country since we have the registration of deaths, those quarters of the year when percolation has first commenced after periods of exceptionally low water are, without exception, the most unhealthy seasons that have been recorded. The quarters of the year when percolation first commenced after exceptionally low water have been the most unhealthy, as, for example, the March quarters of 1838, 1845, 1847, 1853, 1855, 1864, 1865, 1866, 1875, 1890, 1891, which, with the exception of the third quarter of 1849 (the cholera year), are the most fatal seasons on record.

There is no doubt that the sanitary condition of the district greatly influences the results of the movements of the ground water, and the greater the amount of disturbance or the number of disturbances of the ground water in the course of the season in insanitary districts, the greater and more marked the influence upon health until the period arrives when the soil has been washed free from its impurities and the waters have accumulated in the ground.

Certain diseases have their allotted seasons and conditions favourable for their development and spread, and there are a number of diseases usually most rife when the ground waters are low, such as enteric fever, cholera, small-pox, diphtheria, and others.

The state of low ground water as being a condition accompanying epidemics of typhoid fever is a matter of constant observation, and it is a well-authenticated fact that all epidemics of this disease in this country have occurred in periods only of low water, or when immediately following a very low state of the ground water. Ground water influences both small-pox and diphtheria in a most marked manner, but in directly opposite ways, so that when one of these diseases is present the other is absent. Small-pox is accompanied or preceded by intense dryness of the ground, while diphtheria occurs only when the condition of the ground is one of continued dampness. The year 1871 was a very fatal year from small-pox in this country, and in that year the percolation experiments showed that the ground was intensely dry. In 1876 an outbreak of small-pox occurred at Croydon, and continued until the autumn of 1877. Outbreaks of this disease have subsequently occurred in this place in 1881-82 and 1884-85. Since September, 1885, there have been no deaths recorded from small-pox in Croydon, but diphtheria has been very prevalent during the whole of that period, and the ground has been in a constant state of dampness; so much so, that with the exception of one month — October, 1886 — a measurable quantity of water flowed from the percolation gauges every month during all this long period. The last outbreak of small-pox in 1884-5 was preceded by seven months, and that of 1881-82 by five months, when no water percolated through the ground. Since the time when the author first observed this marked coincidence between the dryness of the ground and outbreaks of small-pox, he has learned from the report of Surgeon-Major G. Hutcheson, M.D., Sanitary Commissioner of the North-Western Provinces and Oudh, that the counterpart of this has been observed in India in reference to small-pox, which, it is stated, "is controlled or kept in abeyance by damp and moisture."

The most marked incident in connection with ground water is the remarkable parallelism between the deaths of children under five years of age and the lowness of the ground water; in fact, it is found that the deaths in this case fluctuate inversely in proportion to the volume of the water in the ground.

The coincidence between the rates of mortality of children and ground water occurring period after period is tantamount to positive proof that ground water, at least, if not the direct cause, is the measure of the influence at work which seriously menaces the lives of young persons.

Those who require further information upon this subject will find it in the author's recent Presidential Address to the Royal Meteorological Society.

Mr. Baldwin Latham's paper was followed by a long, useful communication on "Drainage and Irrigation of Land in their Relations to Health," by R. F. Grantham, M.I.C.E.

Mr. **Baldwin Latham** said that there cannot be a shadow of doubt that wherever irrigation is used, malaria follows. Much, however, can be done to remedy this by proper arterial drains after irrigation at some considerable depth.

Dr. **Thomas H. Thornton** spoke of irrigation by canals and condemned it. Subsoil drainage should go hand-in-hand with irrigation. The best preventive measure for malaria would be to sell your water, or else to have the canals at a low level, so that the natives would have to work to raise the water for irrigation. He attributed the malaria as being in a great measure due to the swamping of the ground in consequence of the free supply of water by the Government.

Mr. W. Harpur spoke with reference to subsoil drainage, and laid very great stress on it in laying out towns.

General Maclagan continued the discussion with reference to the spread of malaria by the system of irrigation now being carried on in India, and stated that the matter was now occupying the attention of the Government.

Mr. Maignein explained his view why the death-rate, especially of children, is higher when the ground water is low than when it is high. When the water is low in the well you drain the water from the upper strata, and carry the germs of the disease into the supply.

A paper by Surgeon-Major D. Pringle was also read, on "The Water Supply of India."

English engineers and others interested in sanitation are invited to subscribe to a memorial to be erected at Genvilliers to the memory of Dr. Durand Claye, the eminent engineer of the works of Paris. It is desired that the subscriptions should be numerous rather than that they should be of great pecuniary value. Subscriptions will be received by the President of the Committee, M. L. Marson, at Charing Cross Hotel, up to Monday, afterwards at 6, Avenue Victoria, Paris, or by the hon. secretary of Section VII., Mr. R. E. Middleton, either at the Lecture Hall or at his office, No. 35, Parliament Street, S.W.

SECTION VIII.—NAVAL AND MILITARY HYGIENE.

The opening meeting took place on Tuesday, August 11th.

The first business was the president's address by Lord Wantage, which want of space compels us for the present to omit.

The following papers were read on quarantine:—

Modern Quarantine in Canada and the United States.

By Frederick Montizambert, M.D.Edin., F.R.C.S.E., D.C.L., Medical Superintendent Canadian Quarantine Service, President American Public Health Association, etc. Read by Dr. Collingridge in the unavoidable absence of the author.

The word "quarantine" has been retained in use from habit and for convenience of expression. As applied to our seaboard protective establishments against the introduction of infectious disease from abroad, it has, however, long ceased to imply the idea of a routine time of detention.

"Medical inspection" to detect actual cases of illness; and what is known as "maritime sanitation" to destroy the micro-organisms of disease in vessels, clothing, etc., with, in some cases, the detention under quarantine of observation of "suspects" for a term varying with the period of incubation of the particular disease, constitute the practice covered by the expression "maritime quarantine."

In Canada quarantine is entirely under the National Government. In the United States it is under the various States, and in some cases the seaboard cities. These local quarantine establishments are, however, supplemented by national quarantine or refuge stations. The expectation is that many of the local establishments will come more and more to act merely as inspecting stations, and that vessels requiring treatment will be sent to the nearest national quarantine station.

The details of the appliances in use at our quarantine stations vary—as may well be expected—to a certain extent, in accordance with the special demands of each port. And these demands are influenced by questions of latitude and climate, by the presence or absence of a large annual immigration through the port, and by the distance of the port from a fully-equipped national station.

But the differences are in degree rather than in kind.

There is a general acceptance of steam, the mercuric chloride drench, and fumigation with sulphur dioxide, as our recognized means of disinfection, and the appliances for the use of these several means are adopted more or less fully and completely as the necessities of each particular port may seem to demand.

The main requirements for a quarantine station are held to be as follows:—1. A boarding station, so placed as to command the channel leading to the port. 2. A boarding steamer, fitted with hospital cabins for landing the sick, and with appliances for disinfecting in the offing ships' hospitals with the mercuric chloride drench, and with steam, when such disinfection is found to be all that the vessel requires. 3. A reserve steamer to replace the usual boarding steamer on emergency, and—where the station is isolated—to act as supply and mail steamer, for the forwarding of convalescents, etc. 4. An anchorage for vessels under quarantine of observation. It should be placed conveniently for the main establishment, and safely remote from the track of commerce. 5. A deep-water pier. The depth of water at low tide at its end should be at least equal to the draught of the largest vessels coming to the port, with a frontage sufficient for such vessels to moor to it if required. Upon this pier there should be constructed: (*a*) A warehouse; (*b*) elevated tanks for disinfecting solutions; (*c*) a disinfecting house containing steam disinfecting cylinders; (*d*) sulphur furnaces, engine, exhaust fans, etc., for fumigation. 6. A lazaretto or hospital for the treatment of infectious diseases. 7. Separate accommodation for non-infectious cases from infected vessels in quarantine. 8. Detention houses for the detention under observation, in groups, of "suspects" or persons who have been exposed to infection. 9. Quarters for officers and staff. 10. Telegraphic communication with the rest of the world. Telephonic communication between the different parts of the station. 11. A bacteriological laboratory. 12. A cremation furnace for the disposal of the bodies of those who have died of infectious disease.

The disinfection appliances may be described somewhat more at length.

Mercuric chloride drench. Upon the pier a framework is erected some 35 or 40 feet high. On top of this is a circular wrought-iron tank, capable of holding about 8,000 gallons. The top of the tank is closed by a secure cover to prevent access of light to the solution. On the top of this cover is placed centrally a wooden cask holding about 60 gallons. In this the mercuric salt is dissolved, and then let down into the tank through a wooden faucet; 65 to 70 pounds of the mercuric chloride are used for one charge, the strength of the solution used being from 1 in 700 to 1 in 1,000. In the tank near the lower edge are three heavy faucets of galvanised iron, to each of which is screwed a lead of one-inch four-ply rubber hose. The ends of these lie on the pier, and are lengthened by additional sections to reach any part of the largest vessel. To the far extremity of each hose a nozzle, or a rose for spraying, is attached, provided with a stop-cock. During disinfection all three leads may be used simultaneously, fore, aft, and amidship. On a single vessel from 1,500 to 3,000 gallons may be used in drenching and spraying all attainable surfaces of the vessel excepting cargo, but including ballast, hold, saloons, forecastle, decks, etc. The process requires from half-an-hour to two hours, according to circumstances. The bilge water also is replaced by this solution.

Steam disinfecting cylinders. These chambers, two or three at one station, consist of jacketed, cylindrical shells, made of strong boiler iron, each shell being 40 or 50 feet long and seven or eight feet in diameter, inside measurement, and furnished with doors at each end. All clothing, bedding, hangings, etc., are taken from vessels undergoing maritime sanitation, placed in the cylinders, and allowed to remain for 15 to 20 minutes subjected to a temperature of 230 deg. Fahr. dry and moist heat. A crane is provided for swinging the movable doors or heads into and out of place. The cylinders are covered with hair-felting and canvas to prevent radiation. The clothing, etc., is hung on trucks with clothes racks; these are admitted at one end and taken out at the other. The steam is admitted into the manifolds from a stationary boiler close at hand. The cylinders are provided with safety valves variously weighted and set, according as steam under-pressure or streaming steam may be preferred. Dry heat is first introduced, raising the temperature to 180° to 190° Fahr.; steam is then turned on, bringing the thermometer up to 230°, at which it is held for some twenty minutes or half-an-hour.

Sulphur dioxide fumigation. Various patterns of furnaces for sulphur fumigation are in use. They are all alike in the principle of driving the sulphur fumes by powerful fans with great power and velocity into the closed holds or apartments of vessels, so as to force the fumes into every cranny and crack. The confined air of the hold having first been expelled, is replaced by an atmosphere surcharged with sulphur dioxide. The fan is run by a special engine. The furnaces are connected to the vessel by a pipe of galvanised iron and asbestos cloth of one foot in diameter. An average of three or four pounds per 1,000 cubic feet is employed, and the fumes are generally kept for twenty-four hours in the vessel's hold.

One very good form of this furnace is that introduced by Assistant-Surgeon Kinyoun, United States Marine Hospital Service. It is on the principle of a reverberatory furnace, consisting of a series of shelves arranged one above the other, each shelf holding a pan of sulphur. A forced draught is kept up by means of a fan-blower connected at the bottom. The draught of air charged from the burning sulphur of each shelf is made to reach and pass over the shelf above by means of apertures made by shortening the shelves alternately at their front and back ends. With an experimental furnace repeated experiments gave Dr. Kinyoun from 14 to 16 per cent. of sulphur dioxide, temperature 21° centigrade, while burning sulphur in a closed space gave only 6 per cent. at 21° C., *i.e.*, it would not support the combustion of sulphur above that percentage. A more recently modified furnace at Charleston, South Carolina, has given gas testing 18 per cent. sulphur dioxide.

Quarantinable Diseases.—The Canadian regulations have always, since their first promulgation in 1832, included "Asiatic cholera, fever, small-pox, scarlatina, measles, or any other infectious or dangerous disease." In some parts of the United States the list is limited to yellow fever, typhus, cholera, and small-pox. At ports, however, where there is immigration, the list is more extensive; thus at Boston it includes also diphtheria, scarlet fever, typhoid fever, and measles; and at New York, with all the above relapsing fever is also mentioned, "and any disease of a contagious, infectious, or pestilential character, which shall be considered by the health officer dangerous to the public health." Within the last two years leprosy has been added to the list, both in Canada and the United States; and in the latter country, since the 1st of April last, consumption is classed amongst the dangerous and contagious diseases barring admission, immigrants suffering from it being now ordered to be returned to the ports from whence they came.

Canada has nine principal quarantine stations, viz., Halifax, Pictou, Hawkesbury, and Sydney, Cape Breton in Nova Scotia; St. John and Miramichi in New Brunswick; Charlottetown in Prince Edward Island; the St. Lawrence Quarantine; and Victoria in British Columbia.

The United States Government has eight national quarantine or refuge stations, viz., Delaware Breakwater, Delaware; Cape Charles, Virginia; Sapelo Sound, Georgia; Key West, Florida; Chandeleur Island, Mississippi; and, on the Pacific, San Diego, California; San Francisco, California; and Port Townsend, Washington.

In addition to these many ports have well-equipped stations; amongst these may be specially mentioned New York, Charleston, North Carolina, New Orleans, and Galveston, Texas.

For ports that have not organised quarantines the collectors of customs are efficient aids. In the United States they have by law the power of search and detention of vessels, and in Canada they are required by law to cause a medical inspection of any suspected vessel before granting a customs entry, and if the presence of infectious disease be discovered, they are empowered to send the vessel to the nearest equipped quarantine station.

The Marine Hospital Bureau at Washington compile and issue an "Abstract of Sanitary Reports" which come to them by mail or cable from all parts of the world. This they kindly furnish weekly to quarantine officers. The prompt information this gives of infectious disease abroad, and the warning of what to specially look for in vessels from foreign ports, are of great importance and value.

In the carrying out of the quarantine administration throughout Canada and the United States, full weight is given to the endeavour to reduce to the minimum, consistent with safety, the interference with the liberty of the individual, and with the financial interests involved. It is recognised that seaboard quarantine cannot be expected to entirely prevent the introduction of all disease from abroad without such detention of all vessels, passengers, and merchandise, and such consequent interference with trade and commerce, as would be unjustifiable and impracticable in ordinary circumstances. The necessity for, vital importance of, state, provincial, and municipal boards of health, with their organised system of notification and isolation we are fully alive to. They form, with our seaboard quarantines, our double line of defence. But, on the other hand, we realise that, almost without exception, epidemic disease has come to our continent by ships, and our seaboard quarantines are held accountable for dealing with actual cases of disease arriving, with infected vessels and effects, and with those suspected of being infected. By the methods of medical inspection and maritime sanitation that I have thus briefly endeavoured to describe they strain out and protect the country from a very large percentage indeed of the exotic disease which threatens it from time to time, and that without any undue interference with commerce; and they are further capable of more extended action when special circumstances call for it at any particular time and place.

Quarantine and Medical Inspection.

By Valentine Vignard, D.M.P., etc.

Quarantine is not opposed to medical inspection; each comprises the two essentials of isolation and disinfection. The two systems differ only in the relative application of these details: In quarantine, isolation; and in medical inspection, disinfection, is the dominant idea. The two methods should be merged into a single system, of which disinfection, appropriately employed according to the requirements of each case, should be the essential characteristic. The word quarantine, implying, as it does, a traditional usage dependent mainly on isolation, should be abandoned by sanitary authorities. Rigorous scientific experiments should be instituted with the object of discovering a certain and rapid means of disinfection applicable to ships, with their cargoes and equipment.

The Medical Supervision of the Mercantile Marine.

By J. Stopford Taylor, M.D., Medical Officer of Health for the City and Port of Liverpool.

The object of this paper is to point out the want of system in the medical supervision of the mercantile marine as it exists in Liverpool.

In an old country where regulations have been made to meet the requirements of a growing population, and an extending commerce some of them will become obsolete, and others, if they do not conflict, will certainly not work harmoniously; it is with a view to consolidate these regulations that this paper has been prepared.

The inspection of emigrants, and the sanitary arrangements of emigrant ships, are conducted by medical men appointed by and acting under the Board of Trade. The visitation of ships having infectious diseases on board is made by a medical officer of the Customs, who has power to place any infected ship (except cholera ships) in quarantine; but, by a recent order of the Customs, he is directed to inform the port sanitary authority of any case of small-pox, fever, scarlatina, measles, etc., on board ship, and to quarantine vessels only when infected with plague or yellow fever. If, however, any vessel is placed in quarantine, the Customs have no means of dealing with it in the port of Liverpool, as was evidenced some years ago, when a large steamer was kept in quarantine for five days, and then had to be handed over to the port sanitary authority to be dealt with.

The proceedings of the Board of Trade doctors and of the Customs quarantine doctor, are opposed to the satisfactory working of the port sanitary authority, and are altogether unnecessary; for section 110 of the Public Health Act, 1875, as amended by the Public Health (Ships) Act, 1885, gives power to the port authority to deal with infectious disease and nuisances on board a ship as if it were a house, and the master the chief occupier or tenant. The Medical Officer of the port sanitary authority has no power to place a ship in quarantine for plague or yellow fever, but he has power to detain a ship, under an order of the Local Government Board, if infected with cholera, until he has examined the passengers and crew, and made arrangements for the removal of the sick, if possible. Passengers not suffering from sickness are allowed to land, and the vessel is then thoroughly disinfected and cleansed.

During the prevalence of cholera in Marseilles, in 1884, several vessels infected with cholera arrived in the Mersey from that port, and were treated according to the regulations without any extension of the disease to the crew, passengers, or inhabitants of the port.

In conclusion it is suggested that all medical and sanitary matters appertaining to ships should be under the control of the port sanitary authority, that medical inspectors of emigrants and emigration ships should be officers of the port sanitary authority, that the ship doctors should report to the port sanitary authority all cases of sickness occurring during the outward and homeward voyages, that the Quarantine Act be repealed, and if it be thought necessary to retain any of its powers, let them be transferred to the Local Government Board, who could then make regulations for the management of ships infected with plague or yellow fever, similar to those made for cholera.

Discussion on Quarantine.

Dr. **Bérenger Feraud**, Director French Naval Medical Service, said :—

I did not intend to speak on the question of quarantine, but I think I ought to do so after the interesting paper of Dr. Vignard, so as to avoid all misunderstanding on the subject of this important international question, and to explain that the views of Dr. Vignaud are personal. The question of diseases spread about by importation is extremely important, and must be studied in all its details to arrive at a satisfactory result. It is necessary not to forget that in this case "time is money," and in a congress held in the metropolis of the greatest maritime nation in the world, I am here to express the opinion of all in saying, taking everything into consideration, the end to be attained by hygiene is to preserve the best possible human health. One moment, one day, one week have little importance. France, though it retains the word quarantine, has not slept during the last two centuries; in 1890 she gave proof of the admirable results which she has obtained by her sanitary system in dealing with France. One would believe that, according to Dr. Vignard, that in France the word quarantine implies a long and uniform period of detention, which cannot be shortened. Every day we have proof to the contrary. When an infected ship arrives at a port it is put under conditions to prevent danger to the public health, and the time of detention varies, being always limited to the minimum which prudence will allow. Dr. Vignard only treats the subject from one point of view, and that not the likeliest one to lead to a solution of the problem. In the last conference at Rome the Indian medical men recognised the great importance for Europe of preventing the importation of cholera by pilgrims, and in order to study and apply the means of protecting our countries from this disease it is necessary to study the results they have obtained. Besides, it is not possible that a Congress which treats subjects generally for a short time should be able finally to settle a question such as this. The subject should be referred to an International Commission, composed of scientific authorities of experience. Thus only can we arrive at a satisfactory solution, and the best for the preservation of life, which is the aim of all hygienists.

Dr. **Henry A. Armstrong**, Medical Officer of Health Newcastle-upon-Tyne and River Tyne Port, President of the Society of Medical Officers of Health, expressed his regret that the system at Liverpool as described by Dr. Taylor was allowed to exist. As shown by the distinguished French minister who had just spoken, and also by Mr. Vignard in his able paper, the word "quarantine" in its original sense was ancient and obsolete. Why these continued either in that or any modified sense, especially since arrangements prescribed by the Local Government Board were, in the speakers view, amply sufficient for all emergencies. As medical officer of health of eighteen years standing to the city of Newcastle-upon-Tyne, where all the principles of sanitary supervision were minutely carried out, the speaker has the fullest and most implicit confidence in the efficacy of the arrangements on shore in operation for the prevention of infectious disease, and he was equally confident that the corresponding arrangement afloat were all that was necessary. The conflict of authority with regard to enquiry as to cholera on this coast between the Board of Trade and the Local Government Board was much to be regretted. A few years ago the speaker had personal experience of this conflict, as follows :—

The Assistant Medical Officer of Health on the River Tyne Port had, acting under the order of the Local Government Board, boarded a vessel arriving from a cholera infected port. The crew were, and had been, quite free from diseases, but the ship had not a clean bill of health. The assistant, after completing his examination, left the ship as he was authorised to do under the order above named. Soon afterwards the speaker, as Medical Officer of Health of the Port, received a letter from the Board of Trade, informing him that his assistant had been guilty of a breach of the Quarantine Act. The Medical Officer of Health applied to the Local Government Board for advice as to his duty in a future similar case, but, as might have been expected, had not received any definite instructions on this point. Since, as stated by M. Vignard, steam and electricity had completely altered all the conditions, the speaker considered the quarantine should now be abolished altogether. (In conclusion, the speaker gave his entire support to the views expressed in the concluding paragraph of the paper of Dr. Stopford Taylor.

Dr. **J. Wright Mason**, Medical Officer of Health, Hull, spoke in reference to the inspection of emigrants arriving at the Port of Hull, numbering from 40,000 to 50,000 annually, via Liverpool for America, and the precautions measures adopted. The Port Authority were in complete telegraphic communication with the pilot's boarding station at Spurn, and any illness, however slight, on any ship is telegraphed. There was an inspection of all ships arriving at the port, the emigrants were both inspected on their arrival and departure. A port hospital with all modern appliances had been established in Hull. They had no Customs or Board of Trade inspection as in Liverpool. He was of opinion that the medical inspection should also be vested in the Port Sanitary Authority.

Dr. **ALFRED E. HARRIS**, Medical Officer of Health Town and Port of Sunderland, said that the English Government should make such arrangements with their consuls abroad that immediate information should be forwarded to the Local Government Board by telegraph of the existence of infectious disease, and that they in turn should distribute such information to the various port authorities of the country, so that they would be enabled to watch vessels coming from these ports more closely than they are at present. Instance was given of an outbreak of small-pox among persons who had landed from a ship from a Spanish port, which would have been prevented if a medical examination of the crew on entering the port, and which would have undoubtedly taken place if the speaker had known of the existence of small-pox at the port of departure of the vessel.

Colonel **ALFRED A. WOODHILL**, Major Medical Department, U.S. Army, referring to the desire of the last speaker that local officers might be notified of the approach of infected vessels, said: Such a system is practically in force in the United States. The U.S. Consuls at maritime places telegraph to the Washinton Government the name of the ship and the character of the disease believed to be carried—of course, serious or infectious diseases, which information is immediately communicated to the health officer of the port of destination. What is thus done in the United States, it would appear, might readily be accomplished by a country having such wide commercial relations as Great Britain.

SANITATION AFLOAT.

By R. W. COPPINGER.

The chief difficulty in regard to the provision of suitable accommodation for the crew of a man-of-war consists in the fact that while the vessel must be constructed of manageable dimensions for manœuvring purposes, and is therefore restricted in length, the number of the crew is based upon what is required for the efficient working of the engines, guns, and torpedoes.

In other words, the housing of the crew is apt to be regarded as of secondary importance in the designing of a ship-of-war, as compared with the provision of space for carrying the greatest possible quantity of mechanical fighting material. That this must, to a certain extent, ever be the case, is a fact that has to be accepted by sanitarians; for the primary object of a man-of-war, in fact the object of its existence, is to act as a fighting machine; and the country requires, and the rivalry of other great powers requires, that all other functions be to some extent subordinated to this.

The very limited accommodation available for our crews, with its attendant inconveniences, is not, however, of so much consequence as might at first sight appear to be the case, because future naval actions are likely to differ very materially from those of the past in respect to duration. The terribly destructive action of the three great engines of modern naval warfare, viz., the heavy gun, the ram, and the torpedo, will probably limit the duration of an engagement to a very brief period. Again, owing to the very extensive use of steam propulsion, and the facilities for obtaining information of a vessel's movements afforded by the telegraph wire, vessels will not now-a-days require to keep at sea so long as in former times. Hence it is that the evils entailed by a long-continued subjection to insufficient air-space on board ship, will not (as formerly) come into force so as, by lowering the physical efficiency of our men, to influence materially the issue of a naval action at sea.

The question of air-space and ventilation as applied to men-of-war has always been a difficult problem, and the progress of modern naval architecture, necessitated by altered conditions of warfare, tends in many ways to make its solution more difficult of attainment. Among these conditions may be mentioned (1) the very great amount of air-space occupied by machinery and stores connected with torpedo work, and (2) the introduction of watertight bulkheads. These latter partitions are a great source of difficulty in respect to obtaining a complete circulation of air throughout a ship.

It is of little use to draw comparisons between house ventilation and ship ventilation in regard to the steps to be taken for successfully coping with the latter, because the conditions are widely dissimilar. The contrast must be obvious when one calls to mind the ever varying position of a ship with regard to sunshine and wind, the deflection of air currents caused by the trim of the sails and the consequent interference with uptakes and downtakes, and the number of apertures in the shape of hatchways, ports, and scuttles which have to subserve other purposes besides those of ventilation; all of these rendering somewhat abortive those systems of ventilation (applicable to houses) which depend upon the action of natural forces.

The introduction of the turret and barbette system of construction into our modern battleships, with the consequent reduction and almost complete abolition of apertures for natural ventilation by means of ports and hatchways, has rendered necessary a very general use of artificial ventilation by means of rotary fans, to supplement artificial ventilation by means of funnel and funnel casing.

Since rotary fans driven by steam were first supplied to our ships, opinions have differed as to whether these ventilating appliances should be fitted so as to drive in fresh air or to exhaust the vitiated air. Most of our new battleships are fitted with "supply" fans only, but in two vessels of recent construction there are fans both for supply and for exhaust; so that in these two vessels provision is made for a complete artificial circulation of air throughout the ship. In a ship which was quite recently launched, "supply" fans only are fitted; so that the impression appears to be gaining ground that where one system only is to be adopted, that by "supply" is preferable.

For my own part I am inclined to adopt the view (which will, I fear, be considered heretical by most sanitarians) that on board modern war vessels the "supply" system of ventilation is preferable to that by "exhaust." If the interior of a vessel were an enclosed space without subdivision into many separate chambers, and if there were but two apertures communicating with this space, then, no doubt, the application of an air exhaust to one aperture would, if maintained long enough, change the air of the entire space by the admission of fresh air through the other opening. But such a style of construction is practically not attainable. Exhaust fans, as at present fitted, are apt by a process of what I may call "short-circuiting" to draw in fresh air largely through the hatchway or ventilating aperture nearest to the first opening in the main trunk of the fan, and, as regards distant portions of the ship, to perform the function of merely shifting foul air from one compartment to another. There is, moreover, a possibility of "exhaust" fans antagonising rather than assisting the action of the "supply" fans.

The distribution of air from a "supply" trunk to various parts of a ship is in another respect attended with considerable difficulty, viz., in regard to regulating the flow of air through lateral perforations or grating apertures. This is owing to the fact that in the air-trunk from a centrifugal "supply" fan, although the velocity be considerable, the pressure is very low. Hence it is that the current of air in passing by one of these openings tends to set up an aspiratory action on the vitiated air outside, rather than to deliver fresh air. The action I here refer to is similar to what takes place, when the wind blowing horizontally over a chimney exerts an aspiratory influence on the air inside the chimney, and thus draws up air from a cold firegrate. To meet this difficulty I would suggest that all the branches from a "supply" air-trunk should be made to enter the trunk for a short distance with the ends inclined towards the air-current; or else guides should be fitted so as to answer the same purpose by diverting the required stream of air.

Of all the methods of artificial "exhaust" ventilation applicable to ships, I am inclined to think that that by means of the funnel and funnel casing is the most satisfactory.

The steamjet exhaust (Edmonds') is at present used only in troop-ships, and is considered objectionable on account of the noise, the collection of water arising from condensation in the ventilator, and the waste of steam.

A method of extracting foul air by means of the induced draught set up in a ventilating shaft by the emission of compressed air at low tension discharged from a ring-jet is now in contemplation.

The warming of men-of-war (more especially ironclads) in cold weather is a very important matter, not hitherto sufficiently provided for. The usual method at present is by means by bogey fires, a method which is not only troublesome and dirty but is also dangerous, both in regard to the risk of the decks catching fire and the products of combustion causing asphyxia from insufficient outlets for smoke being provided. A better plan would be to have a system of steam pipes disposed throughout the berthing deck, and arranged so as to take steam from the main boiler, furnished, if necessary, with reducing valves so as to maintain a low and uniform pressure.

A greater difficulty is to provide a means of cooling the air between decks in tropical regions, more especially when the ship is at sea and under steam. It has been suggested that this might be effected by using compressed air, both as a source of motion for ventilating purposes and also as a means of abstracting heat when undergoing expansion while doing work.

In order to facilitate the application of artificial ventilation to the sleeping places on board ship, I would urge that in the construction of our battleships a single space (uncomplicated by bulkheads) should be set apart for the accommodation of the crew. (At present the crew, at all events as regards their sleeping billets, are scattered over various parts of the ship.) Such a scheme would render it possible to lessen the number of branches and apertures to ventilating shafts, and therefore to concentrate and regulate with more precision the application of ventilating apparatus to that portion of the ship where it is mainly needed. Moreover, if the crew were thus grouped together the task for providing for the maintenance of a suitable temperature would be less difficult.

In turret and barbette ships such a space might perhaps be provided by giving greater capacity for accommodation of crew in that portion of the ship inside the breastwork; while in other classes of vessels the best position for the accommodation of the crew is under a roomy forecastle. In this latter situation there is little difficulty in obtaining efficient natural ventilation. Such accommodation (viz., in forecastle) is to be found in troopships, and to some extent in war vessels of a certain class.

Dr. PAUL HYADE, Principal Medical Officer of the French Navy, said: I wish to emphasize a point which appears to me very important in the interesting communication of Dr. Coppinger's paper. I wish to speak of ironclads especially. There is with them a difficulty which has been very keenly felt in the winter by our Mediterranean Squadron, and still more so by the ships of the Northern Division. On these vessels the temperature has often remained for several days 3° C. in those ports occupied, and added to the inevitable moisture, this is a cause of real suffering, while, at the same time, it is a bad hygienic condition for officers and crew. In France steam heating has been used on board some of the warships, and experiments are being made to apply it to all classes of ships, but I am of opinion that we are being outstripped in this by the ships of the United States. I should be exceedingly glad to see some representative of that navy in this Section to explain their system.

Dr. COLLINGRIDGE, Medical Officer of Health, Port of London, said: I wish to make a few remarks with regard to the question of warming forecastles and crews' quarters. The present system of cast-iron unlined "bogies" is a most dangerous, extravagant, and objectionable one. There is a great difficulty in keeping up fires in these bogies for any length of time, and therefore a constant temptation to overheat in order to keep up the temperature as long as possible. Though rapidly heated they rapidly cool, and hence are inefficient. When heated, they allow of the free passage of carbonic oxide and other products of combustion, and hence are dangerous. Added to this they are very easily broken on account of both their size and shape, and therefore are in the long run very expensive. Having made a series of experiments, I have come to the conclusion that the only reasonably effective and economical stove for this purpose is a circular wrought iron one, lined entirely and covered with fireclay. As to the question of ventilation, I would point out the very great difference between ships of war and merchant ships. In ships of war the constant tendency is to divide and sub-divide space by bulkheads, and thus to interfere with ventilation to such an extent as almost to make change of air by exhaust an impossibility, and in this case it becomes almost absolutely necessary to resort to "supply." But in merchant vessels the case is otherwise. Here the exhaust system modified to meet each individual case is the only one available. The general tendency in the construction of mercantile vessels is open up as far as possible, and hence to facilitate ventilation.

Professor J. LANE NOTTER, Netley: The subject of the ventilation of ships is most important, and we are all indebted to Dr. Coppinger for his able paper on this question. We all know that sickness and mortality are largely increased by impure air, and to this, in a peculiar degree, those who "go down in ships" are subject. There are few analyses of the actual composition of the air of ships that I know of. Drs. Moss and Belgrave-Ninnis made some determinations of the carbonic acid in war ships, but they were undertaken some years ago, and have not, that I am aware of, been repeated. It would be desirable to have these experiments repeated. No one system of ventilation is applicable to all ships. Those carrying cargoes require to have the hold specially ventilated. This might be done through hollow iron masts acting as ventilators. In the Royal Navy, as no special ventilation of the hold probably is required, It is doubtful whether placing all the crew in one part of a ship is desirable. If the difficulty of ventilating the whole ship is so great, this would be intensified if a part only was occupied by a large number of men, and if the system of ventilation at any time failed the danger would be sadly increased. If the motive power could be transferred without loss of force to the extreme ends of the ship by means of tunnelling like the Westinghouse brakes on railways, I feel sure some plan might be adopted which would exhaust the impure air, or the "plenum" system might be adopted if found better. The difficulty of using the steam engines as a motive power lies in the fact that at a distance the force is so diminished as to be practically *nil*.

Dr. H. E. ARMSTRONG: The subject of cubic space in respect of ventilation, like that of quarantine, was one in which conflict of authority interfered with sanitation. The Board of Trade allowed a minimum of 72 cubic feet per person in the British Mercantile Marine. This amount

(3 ft. by 3 ft. by 8 ft.) was merely that of a large box painfully suggestive of a coffin, which, indeed, if not exceeded, it was. True, the Public Health Act gave power to deal with overcrowding, but what sanitary authority could hope to abate overcrowding on shipboard in face of such a regulation as that? Happily, shipowners were, in common more humane than to act up to the margin of its menu. Nevertheless, the overcrowding in the crew spaces is great, and accounted for much of the prevalence of respiratory diseases among crews. With referenceto the subject of "bogey" fires, the speaker fully endorsed the remarks of Dr. Collingridge. Such fire, either when cracked or left open, gave off carbon monoxide, which was injurious to the health of those who breathed it. One of the well-known effects of the presence of this noxious gas in the [cabins of e.g. passenger boats in crew spaces was drowsiness Carried to a greater excess death resulted from its inspiration. The serious effects of the defective ventilation of stoke-holes on the health of the firemen demand the attention of all interested in sanitation afloat. The smoke nuisance was another evil in connexion with steamships. This was in this country difficult to deal with, both from a practical and a legal point of view. The power given by the Public Health Act to deal with smoke from steamships applied only to vessels "lying in" the district of a port sanitary authority, and not to vessels in motion. But every one knows that it is during movement that the smoke is given off in largest quantity and such a vessel could not be interfered with. The speaker was hopeful that the recently-exhibited "smoke annihilator," of Elliott, would be found effectual on shipboard. In connexion with offensive cargoes one cause of ill-health among crews was their imperfect protection in crew spaces from the exhalations of the cargo by reason of defective bulkheads, &c.

Dr. Coppinger's reply: I desire to state that I agree entirely with Dr. Collingridge's remarks in regard to the "bogey" fire being an objectionable means of ship warming. It is, however, better than nothing, and cases arise when it has to be resorted to. In the Royal Navy the greatest care is taken to allow free exit to the products of combustion. Moreover, the pattern used in the Royal Navy is not so likely to set fire to the ship as that described by Dr. Collingridge as used in the mercantile marine. In the Royal Navy due allowance is made for the loss of air-current arising from friction in angles and subdivision of ventilating shafts. In regard to Surgeon-Major Notter's remarks as to the grouping of the men in one compartment being open to the objection that insufficient air space would be provided, I entirely agree with him that such a scheme would be inadvisable if it involved any reduction in air space allowance. My idea is altogether in favour of an increase in air space accommodation, combined with better supervision of the ventilation in the living space.

Provision is made for the temporary ventilation of the lower parts of war vessels, by introducing cool air from a supply van by means of a canvas box lid to the bottom of the compartment; the foul air being allowed to escape from a manhole opening.

In all our modern war vessels, stokeholes are efficiently ventilated. The stokehole is made air-tight, the only exit being by way of the furnaces, and fresh air is driven by means of supply fans; thus a double object is gained, the fires being urged, while the men are supplied with fresh air.

SECTION IX.—STATE HYGIENE.

In this section, on Tuesday, speaking to the Presidential Address of Lord Basing,

Dr. Whittaker (of Belfast) deprecated the building of houses for the working classes in Dublin by the Corporation, because there was plenty of private capital and enterprise. He also deprecated the fitting-up of water-closets, because they soon got out of order, and were then worse than useless. In one house he had inspected the water-closet had been turned into a fowl-house.

Sir John Banks (of Dublin) remarked that the Germans used to refer to Ireland as the land of spotted fever (typhus). No longer did it deserve that name, owing to the exertions of Sir Charles Cameron and others.

After a few remarks from Mr. Robert Hampson (Highbury), Sir Charles Cameron briefly replied.

Dr. Tomkins (of Leicester) read a paper on the "Desirability of the State Undertaking Scientific Investigation into the Origin and Causes of Disease, &c.," an abstract of which will be found in the official volume of abstracts.

Dr. Wright (of Dublin) read a paper on the same subject, an abstract of which will be found in the same place.

In the discussion which followed Dr. Tomkins and Dr. Wright's papers,

Miss Annie Goff (delegate of the Personal Rights Association) said she spoke from a standpoint of a nurse. Speaking of foreign schools, she referred to the recent experimental inoculation of cancer into human beings, and also some unjustifiable proceedings in France, and said she did not wish to see the English copy the methods of foreign countries.

Dr. Houghton (of Upper Norwood) said that he did not always see the use of State support, because many of the investigations were not founded on sufficiently certain science.

Dr. Tomkins, in replying, deprecated the discussion being carried into the region of sentiment, and pointed out that the practical bearings of researches were not always immediately apparent, but were none the less useful; and, because of the great difficulty of recognising a bacillus under the microscope, should we therefore cease to carry on bacteriological research?

On Wednesday, at the meeting of this section, Dr. Richard von Hauffmann, of Vienna, took the chair.

Papers were read on

(I.) State Control in Reference to the Homes of the Working Classes.

(1.) By Dr. Elgin Gould, of Washington He dwelt on the rapid growth of American cities, the evil results of which fell chiefly on the poorer classes. He described the condition of things which existed among these classes in Washington, and which resulted in a death-rate amongst them of 1 in 33 Then the various reforms which had been instituted were described, resulting in a death-rate of 24 per 1,000, and amongst children under one year of age the death rate fell from 49 to 40 per 1,000.

(2) By Mr. John Hamer, Hon. Sec. of the Mansion House Council on the Dwellings of the Poor. He pointed out especially the unpopularity of large buildings, and favoured the establishment of cottage dwellings either in town or, by preference, out in the country.

(3) By Dr. Theodore Thomson, formerly Medical Officer of Health of Sheffield, and now Medical Inspector of the Local Government Board.

(4) By Mr. G. M. Burroughs, and

(5) By the Secretary, for Mr. Henry Rutherford.

In the discussion which followed, Dr. Pankhurst, of Manchester, referred to the Housing of the Working Classes Act (1890), as a very valuable statute. But what was really wanted was the arousing of the public conscience. Hence the great value of a Congress like this. He advocated beginning with the very lowest classes.

Dr. Louis Parkes, Medical Officer of Health for Chelsea, discussed the question of centralisation *versus* decentralisation. A certain amount of the former was necessary, but he thought this kind of control was best administered by the County Council, since they best knew the local conditions. The State Departments were too apt to look upon the question as one of numbers only. It is not sufficient to leave the matter to be initiated only by complaints or private suggestions. Areas must be regularly inspected. Unfortunately there were not sufficient inspectors for this.

Government might help by removing the "sanitary law from police courts," great delay occurred in this latter and caused great waste of time. There might, with advantage, be a special court for administration of these matters, perhaps conjoined with School Board cases. Government might also assist by improving the Buildings Acts in some particulars. Model blocks of dwellings were built much too closely together, not allowing sufficient light and air to enter. The County Council ought to have powers to prevent this, and exercise more control over the building. Especially was this needed in the suburbs.

Mrs. Sheldon Amos pointed out that great difficulty occurred when the lower classes persistently kept up their low habits after leaving their slums; in the new buildings they would sometimes take the doors and cupboards to light the fires.

Mr. Mark Judge (Paddington [Vestry), in criticising Mr. Rutherford's paper, also pointed out the great paucity of inspectors. These were not at all adequate for the work to be done. He was against centering too much authority in the State, for in that way details were apt to become stereotyped. There ought to be some competent expert in every district who could give a certificate of good sanitary condition. He deprecated the question being confined to any one class; it was a question concerning the houses of all classes.

Mr. Hugh Alexander (Sanitary Inspector of Shoreditch) spoke in high terms of Mr. Hamer's paper. He thought that medical officers and sanitary inspectors ought to have State protection.

Dr. Elgin Gould, in replying, said that most of the difficulties mentioned had been solved in the United States, and suggested a study of sanitary legislation of the City and State of New York. He advocated the great importance of regular sanitary inspection instead of depending on private complaint, and the registration and certification of houses before they are allowed to be let or sold. It was an excellent provision in the New York health law to only allow 78 per cent. of a building plot to be built upon, and to regulate the height of the block by the width of the street. In that city a tenant could not get any water supply until the plumbing had been certified as correct.

Mr. Mark Judge proposed: "That the sanitary registration of buildings is desirable in the interest of the public health," and another longer resolution was proposed by Dr. Pankhurst, but, after some desultory discussion, it was decided to proceed to the next business.

A paper was read by A. E. Fletcher, F.I.C., F.C.S. (Chief Inspector under the Alkali Act) on

THE PRESENT STATE OF THE BRITISH LAW RELATING TO THE DISCHARGE OF NOXIOUS GASES FROM MANUFACTURING PROCESSES.

In addition to the ordinary sources of air pollution in towns and manufacturing districts, such as arise from overcrowding, from defective drainage, the emission of coal smoke, etc., are the noxious gases arising from various chemical operations conducted often on a large industrial scale. It is the object of this paper to draw attention to the regulations that have been made concerning them. The law makes no attempt to stop such operations on account of the noxious gases that are generated, but adopts means for regulating them, and sets a limit to the amount of such noxious gases which may be discharged into the air.

The Alkali Act of 1863 was the first attempt on the part of the legislature to deal specially with the noxious gases of chemical works. Passed tentatively for five years, it was renewed in 1868, and has been succeeded by the Acts of 1874 and 1881.

Previous to the passing of these Acts, redress for injury sustained from the action of noxious gases in destroying the farmer's crops, his trees, etc., could only be sought by an appeal to the common law, which was, however, found insufficient to afford compensation in the cases here referred to. The Alkali Act designed rather to prevent such injury than to give compensation for it, makes the emission of acid gas, beyond certain limits, a penal offence. Under it inspectors are appointed with power of entry to the works in order to secure the observance of its provisions. The Act has not been found oppressive, but on the other hand helpful to the manufacturer.

In the last Alkali Act, that of 1881, many works, other than those for the production of alkali, are brought within its scope. There are now 1,034 works registered under it, of which 133 only are alkali works. Only those processes of manufacture come under the Act which are specially named in the schedule appended to it. This has led to strange anomalies, owing to the constant change and development of chemical processes, and it is much to be desired that a more general Noxious Gases Regulation Act should be adopted, whereby all works, where certain noxious gases are generated, should be brought under its control. These noxious gases form but a short list, namely, chlorine and its acid compounds, the acid compounds of fluorine, nitrogen, and sulphur, including sulphuretted hydrogen. To these may be added metallic fumes containing lead, antimony, arsenic, or zinc. An Act for regulating all works liable to discharge any of the foregoing substances would not require amendment from time to time, as must be necessary when the specific processes of manufacture are named, since these are ever changing.

Some even would think it better to make no attempt to enumerate the gases to be considered noxious, and to enact simply, that in the case of every manufacturing process from which a noxious gas may be thrown off, the manufacturer should use the best practicable means for preventing the escape of such gas into the atmosphere. For the purpose of such an Act a noxious gas might be defined as "a gas which gives offence, and is the subject of complaint to the local authority on the part of ten neighbouring ratepayers."

III. Dr. P. F. van Hamel-Roos (of Amsterdam) read a paper on "Adulterations and International Measures for their Repression."

Dr. Abbott (of Boston) in discussing this paper stated the laws in the State against the emission of noxious gases were amongst the oldest they had, dating back as far as 1697. They had, however, little to do with alkali works, the principal work they had to deal with being those for artificial manures.

IV. Dr. Danford Thomas read a paper on "State Control of the Sale of Poison." In the year 1889 15,025 persons died of violent deaths, and of this number 636 died of the effects of poison; 376 from accidental or negligent use of poison, including the following substances: Arsenic, mercury, lead, copper, caustic acids (carbolic and other), turpentine, opium, morphia, paraffin, iodine, oil of almonds, prussic acid, cocaine, antipyrine, etc. These records did not include a vast number of cases which recovered, and which were not recorded. Many of these poisons were contained in patent medicines. The great facility with which both these and even crude drugs could be obtained, was alluded to.

There are three acts which regulate the sale of poisons, the Arsenic Act (1851) and two Pharmacy Acts 1852 and 1868. Chandlers and oil-men sell poisons, but others also do the same: drapers and grocers, sell medicines of the composition of which the vendors are wholly ignorant. It was much too easy to obtain poisons, whether in secret or patent medicines, or crude drugs. The reader would increase the first list of poisons, and suggested that they should be sold in blue bottles properly labelled, and not sold to any person under sixteen years of age. It was an extraordinary fact that the Japanese and other nations were ahead of us in this respect, having laboratories for the analysis of patent and secret remedies, and adequate legislation. The reader would make all proprietory medicines really patent; would abolish licenses to sell them; and would confine the sale to chemists and druggists only.

In the discussion which followed, Dr. Littlejohn referred to the great ease with which laudanum could be purchased. He had taken 10 or 12 little phials out of the pockets of suicides.

Brigade-Surgeon McGann (P.M.O. Mysore State in India) also spoke, and

Mr. Carnegie (President of the Pharmaceutical Society) cordially agreed with Dr. Thomas's conclusions in the interests of the public. He pointed out the inconsistency of placing restrictions on chemists selling certain articles, yet a huckster in the street could se'l the same thing, mixed with a little treacle and water.

It was moved by Dr Danford Thomas and seconded by Dr. Littlejohn, "That, in the opinion of the International Congress of Hygiene and Demography, it is essential, in the public interests, that the existing law regulating the sale of poisons should be amended, and greater restrictions placed on the sale of poisons, and this especially in Great Britain and her colonies.

This resolution was carried.

DIVISION II.—DEMOGRAPHY.

We had no space to report the whole of the discussion on Dr. Ogle's paper which was read on Tuesday. We give it here:—

M. Körösi (of Buda Pesth) said that tubercular diseases were very common in those following a sedentary occupation, and that possibly effect and cause were simply inverted, the occupation being chosen on account of the state of health.

Dr. Duncan drew attention to one special occupation, viz., plumbers and painters. Were they equally liable to lead poisoning? The difficulty in determining was due to the fact that in England, painters sometimes worked as painters, and sometimes as plumbers. In Scotland, however, they were specialised as two distinct classes. He (Dr. Duncan) had made some investigations in Glasgow, and found that plumbers and painters suffer about equally from lead poisoning. He found that plumbers suffer very little from diseases associated with inhalation of sewer gas, although they were constantly in the habit of inhaling these gases from plugged-up pipes, etc. Only three cases of diphtheria occurred amongst the plumbers of Glasgow during a period of eleven years. Plumbers were especially liable to phthisis and other diseases of the respiratory organs, the cause being probably exposure to bad air and cold on roofs of houses, etc, rendering the lungs a fitting soil for the growth of the tubercle bacillus. He pointed out that although the tubercle bacilli were found in sewers they were not found in sewer gas, hence that phthisis was not caused by sewer gas.

Dr. Arledge said that Dr. Ogle apparently accepted the doctrine of the London school with regard to the connection between lead and urinary diseases. He (Dr. Arledge) had examined a large number of patients suffering from lead poisoning owing to being engaged in the pottery trade, but not 1 in 700 had albuminous urine. He also pointed out that Dr. Ogle had omitted to mention linen workers, although their rate of mortality was very high—higher even than wool workers.

Professor Bohmert and M. Brousse also took part in the discussion.

Dr. Ogle replied very briefly. He thanked the various speakers for the way in which they had accepted his paper. He quite recognised the many difficulties, and did not wish to attach certainty to the figures in his tables —they were only approximately true. He had taken pains to obtain the best material, and to avoid errors as far as possible.

Dr. Von Mayr then read a paper on the "Insurance Societies of the Working Classes."

This was followed by a paper by Mr. Rowland Hamilton on "Thrift in Great Britain," in which he referred briefly to the imperfect nature of the statistics available owing to old and new methods overlapping. He referred to the Savings Bank, which first became known in latter part of the eighteenth century. In 1861, deposit £41,000,000, owned by 1,000,000 depositors. At the present time, £120,000,000, owned by 6,000,000 depositors. A sketch was given of position of friendly societies, co-operative societies, building societies, cattle insurance societies, and working men's clubs. The speaker concluded his paper by dwelling on the problem of State as compared with independent action.

Mr. Fox then read a paper by Mr. Whymper on

Board and Lodging of London Work Girls.

He said that the female workers of the metropolis might be divided into three classes—(*a*) Those who lived in the establishments of their employers—the large West-end drapers' shops, for example. In twenty-five of them he found there were 6,000 females employed; the majority of them slept on the premises. The accommodation and food were both very good. (*b*) Those who lived in Homes, chiefly carried on under the auspices of benevolent societies; they were mostly used by servants. (*c*) Those who lived in lodgings. This last class were exposed to many temptations, the loneliness of their lives often leading them to prostitution.

Mr. Schloss commenced the discussion by saying that Mr. Hamilton had shown that there was a vast amount of thrift in this country, nor were we behind-hand in co operation.

The discussion was carried on by M. Greulict, of Zurich, and Mr. Tate.

Mr. Newbatt, President of the Institute of Actuaries, said that all papers they had listened to had this one thing in common, viz., they exhibited that an awakening had lately taken place with regard to the obligation of one class towards another class. He agreed with Mr. Schloss that we in England were not open to much reproach. No nation made so much provision for sickness as we did, although this fact is often lost sight of because of inefficient organisation. A great movement was now going on with regard to the provision of pensions for old age, both in Imperial Germany and in Republican France. The actuaries of England, however, believed it to be an unsound movement—the data to be insufficient, and the responsibility to be thrown on the nation very great. The idea that everybody should be provided with a pension at the expense of a nation meant compulsion, and the English people were not ready for this. The question, although at first sight a visionary one, was, nevertheless, one of great importance, but he (Mr. Newbatt) did not consider that the German nation had solved the problem.

Dr. von Mayr and Mr. Hamilton briefly responded.

The paper by Dr. Migerka, Chief Sanitary Inspector of Factories, Vienna, on "Museums of Industrial Hygiene," was taken as read. The paper gave a list of contents of industrial museum established at Vienna, and no special conclusions were drawn.

The paper by Mr. B. H. Thwaite, C.E., on the "Economic Advantages of Industrial Hygiene," was also taken as read. An extract of this paper will be found amongst the abstracts of papers issued by the Congress.

The proceedings terminated with a paper by Senor P. Garcia Faria on the "Demographical Statistics of Barcelona."

This division met at ten o'clock yesterday. The President (Mr. Francis Galton) commenced the proceedings by referring to the form in which resolutions should be brought forward. He had consulted with his colleagues, and as a result the following regulations had been made with regard to resolutions and amendments to be brought before the Congress :—

(1) All resolutions before being submitted to the meeting must be in writing, and handed in to the Secretary of the Section before ten o'clock on Friday morning.

(2) They must be signed by the proposer and seconder, and must bear the signatures of not more than six persons.

(3) They must be accompanied by translations in each of the other two official languages. After the papers on Friday, the proposition would be put before the meeting, and votes taken—

1. That the resolution be endorsed on the minutes.

2. That the resolution shall be adopted by the Congress. If this be approved of, the number of persons voting for and against should be recorded.

After some discussion on these regulations, a paper was read by Mr. E. G. **Ravenstein**, F.R.G.S., on

The Temporary Migration of Labour.

Mankind, speaking broadly, may be divided into sedentary and migrant peoples, including nomads, fishing and hunting tribes among the latter. The present paper only deals with temporary migrants among sedentary peoples. We know from the census returns that in continental Europe 29 per cent. of the population live outside the parish of their birth, but if a return could be obtained of those who in the course of the census year had spent some time away from their homes, the proportion would be very much greater, rising perhaps as high as 50 per cent. Temporary migrants may conveniently be divided into three classes, viz., seasonal migrants, migrants who leave their homes for a limited number of years, and perennial migrants. Among seasonal migrants are harvest-men, pastoral migrants in the Alps and other mountain districts, a great proportion of the men engaged in the sea fisheries, pilgrims to holy places, as also the thousands who annually spend the season in town in pursuit of social pleasures, or who resort to the country in search of health and leisure. Harvest-men and fruit-pickers occupy a very prominent position among this class. Annually some 35,000 Irishmen leave their homes to work elsewhere in Ireland, or in the sister kingdoms. Even more formidable is the exodus from London and other towns of south-eastern England when the season of hop and fruit picking arrives. Many of these temporary "helps" are respectable, but large numbers are given up to drink and gambling, and are gradually acquiring the wonted habits of veritable nomads. Among migrants who leave their homes for a limited number of years must be included not only the coolies and other free labourers who have come to the fore since the abolition of slavery, but also a large number of mercantile men, colonial officials, soldiers and sailors, students at universities and colleges, and missionaries. Lastly, there are the perennial migrants, who spend only an occasional holiday at their "home," as is the case with most seamen in the mercantile marine. To the same class may be referred many railway officials, navvies, tramps, and vagrants. It will hardly be denied that temporary migrations are in many instances beneficial, but they are not universally so. As regards our European "harvest-men," it may be conceded that an occasional holiday benefits them both physically and materially, but their absence from home must not be sufficiently prolonged to estrange them from it, and develop those nomad instincts, the existence of which among many of the fruit-pickers of Kent is so keenly deplored by the Rev. J. Norton Neale. On the other hand it is desirable on social, economical, and political grounds that our rural population should grow in numbers without still further reducing the earnings of individual workers. Among the means to that end are the multiplication of agricultural allotment, the promotion of methods of tillage fully occupying the husbandman out of harvest-time, and the introduction of home industries. Coolie labour, as organised at present, appears wasteful, and it seems preferable to substitute for it a system of permanent emigration of entire families.

M. **Levasseur** then read a paper on

Migration within France.

An animated conversation took place amongst the members of the section during the reading of this paper, which prevented our reporter from hearing much of it. It cannot be said that order was preserved by the President, and we regret to say that no copy of the paper was printed; we are, therefore, unable to give any report. We shall be glad if M. Levasseur will send us his paper, which untoward circumstances prevented the Congress from hearing.

Dr. **Mouatt** introduced the discussion by speaking of the migration of coolies from India, a subject with which he was well acquainted. He spoke of the great difficulty of the subject, and mentioned that the coolies who had migrated to the Assam tea plantations had done so with most disastrous effects, dying off by hundreds. He proposed to send some statistics of the subject to the Statistical Society.

Surgeon-General **Ireland** spoke of migration from Ireland. In proportion to backwardness of civilisation this migration seemed to exist; Mayo, for example, the least civilised part of Ireland, sent more agricultural emigrants than any other part of the country.

Several speakers expressed disappointment that M. Ravenstein's paper had not been printed and circulated before the meeting of the section.

Mr. **Hamilton** and Professor **Mayo Smith** continued the discussion, the former pointing out how dangerous it was to draw general conclusions from single instances. The latter spoke of the migration of French Canadians to New England. They were very saving, and remained many years, but they did not become naturalised, did not send their children to school, and altogether dislocated the social arrangements in the New England towns.

M. **Ravenstein** briefly replied.

The subject of the "Suitability of Tropical Highlands for European Settlement" was introduced by Dr. **Felkin**, (Lecturer on Diseases of the Tropics in the Edinburgh School of Medicine), who read a paper on

The Effect of Altitude on the Suitability of Tropical Climates for the Permanent Residence of European Races,

of which the following is an abstract :—Introductory remarks upon the effect of altitude in the temperate zone. (*a*) Upon temperature, (*b*) rainfall, (*c*) atmospheric pressure, (*d*) individuals, and (*e*) disease. In the tropics there may be said to be three vertical zones of climate :—I. A zone extending up to a height of 3,000 feet, having a mean annual temperature of 72° to 82° F.—the hot zone. II. A zone from 3,000 to 12,000 feet, with a mean annual temperature of from 41° to 73° F.—the temperate zone. For purposes of description this zone may be divided into two parts—the higher and cooler with a mean annual temperature of 41 deg. to 55 deg. F., and a lower or warmer part with a mean annual temperature of 55 deg. to 73 deg. F. III. The zone, having an altitude of from 12,000 to 16,000 feet, with a mean annual temperature of from 30 deg. to 41 deg. F.—the cold zone. Each of these zones has peculiarities of its own with regard to the presence or absence of disease, and the higher the altitude of a region the more nearly it approaches the climate of Europe. As we proceed north and south of the Equator, the boundaries of these zones are found at gradually diminishing elevations, and therefore heat, atmospheric pressure, and moisture vary at different latitudes.

For the permanent residence of Europeans in the tropics a comparatively high altitude is requisite, and the paper concludes with an attempt to specify those areas within the tropics where favourable conditions may be found.

Papers on "The Suitability of Tropical Highlands for European Settlements" were read by Surgeon-General Sir **Wm. Moore**, K.C.I.E., Dr. C. E. **van der Burg**, and **Clements Markham**, C.B. Want of space prevents our giving these papers in full. Dr. Van der Burg drew the following conclusions: That the colonisation of tropical highlands by Europeans was physiologically possible; that field labours would have to be excluded; that colonization would not be successful for some centuries; and, finally, that for economic reasons it was not possible.

Mr. **Clements Markham** thought that the influence of rainfall and climate on soil, affecting thereby the food supply, was much more important in considering this question than the effect of heat on the individual.

Mr. Fox read a letter from Dr. Giles written in India, in which Dr. Giles ridiculed the idea that there was any marked difference between English children brought up in India and those brought up in England. He had ample opportunity of studying the question, and had drawn up statistics on the growth and development of English children in the tropics, the majority of whom were of pure European descent.

The discussion was carried on by Professor **Stokvis**, of Amsterdam, who denied that there was such a disease as true tropical anæmia—the patients were pale, but the blood was quite normal, whereas in European anæmia there was a diminution in the amount of hæmoglobin, and in the number of red blood corpuscles.

Surgeon-General Dr. **Ewart** said the question was whether pure Europeans exported to one of the tropical hill climates of sufficient elevation could undertake outdoor labour with safety and efficiency. If they could do so, then colonisation, in the true sense of the word, would take place; but if outdoor labour could not be undertaken, then deterioration would take place and colonisation be impossible. In his opinion there was no chance of elevated tropical regions ever becoming colonised by pure Europeans, and to entertain the idea would only lead to disappointment.

Dr. **Milliet** criticised the causes of death in the high parts of Switzerland, as given by Dr. Felkin. He pointed out that only about 20 per cent. of the death returns in high parts of Switzerland were accurate, owing to the few medical men practising there. He drew attention to the opportunity which would shortly be given when the railway from Grindenwald to the top of the Jungfrau was completed, of estimating accurately the effect on the human body of rapid removal from a valley to high elevations.

Owing to the lateness of the hour the readers of the several papers did not reply, and the discussion came to an end.

After various medical geographical maps had been explained, Mr. Haviland, M R.C.S., read a paper on

THE INFLUENCE OF CLAYS AND LIMESTONES ON MEDICAL GEOGRAPHY.

Many years ago the author was struck with the close relation that the high and low mortality from some causes of death bore to certain well-marked geographical features in the localities where those causes either prevailed or were infrequent. The first of his series of maps of disease distribution represents the medical geography of certain fatal malignant diseases among females, which were certified by English medical practitioners as cancer in some of its forms. This map, which covers the ten years 1851-1860, plainly demonstrates that the high mortality districts (from these causes) were to be found in the low-lying valley areas characterised by clays of all ages, which were subject to seasonal floods caused by the fully formed rivers that traversed them. On the other hand, the same map shows that the low mortality districts were to be found in such regions as were high and dry comparatively, not subject to floods, and had their soils resting on the older rocks, including the paleozoic and mesozoic limestones. What was true for 1851-1860, is equally so for 1861-1870 so far as his latest investigations go. Some of the results of his recent investigations he then exhibited in the form of coloured maps of the distribution of cancer among females at all ages, and at and about 35 years of age, in the Lake District, Cumberland, and Westmoreland. The structure of the earth's crust was then briefly described, and illustrated by a geological map of England and Wales, the author dwelling on the facts—(1) That of the 60 or 70 elements of which the crust consists, those which formed the bases of clays and limestones—namely, aluminium and calcium—form 10 and 4·5 per cent. respectively, and when united with oxygen in the form of alumina, amount to 19·0, and of lime to 6·3 per cent. Clay is associated in our minds with impermeability and moisture, lime with permeability and dryness. Clays are connected in the history of disease with the most deadly scourges to which the human race has been subjected; while the first evidence of animal life is to be found in the earliest limestone rocks, a fact at once interesting to the geologist and biologist. In conclusion, the author urges the attention of this Congress to the facts which the vital statistics of our country bring out when plotted in colours on maps, and explains the value of such maps. He describes how local climates are affected by clays and limestones, and how they influence the health of the populations living on them. Such maps, too, in the practice of preventive medicine are indispensable.

Mr. **Haviland**, towards the end of his paper, made some remarks reflecting on the present Registrar-General's office for England and Wales (Dr. Ogle).

Dr. **Ogle**, in reply, completely cleared himself from the charges brought against him. He apologised for troubling the meeting with a personal matter, but pointed out how obviously absurd it was to suppose that they at the General Register Office were jealous of Mr. Haviland's map of cancer distribution in England, and had taken means to stop further inquiry at the office. The reason why he had not followed his predecessor's example in keeping males and females separate in making statistics was because it was most essential to take age into consideration, and if this were done the difference of sex must be ignored to get any rates at all. Dr. Ogle then said a few words on the geographical distribution of cancer, and threw doubts on a geographical influence on the disease. He said that it might appear true that cancer was more prevalent on damp soils than on dry ones. London and Cambridge, for example, had a high mortality from cancer, but the high mortality in London might be accounted for by cancer hospitals, and the large number of people who came up to London for operation.

Dr. **Longstaff** mentioned that he had always received the greatest courtesy and kindness from the authorities at the General Register Office.

Mr. **Haviland** was extremely anxious to reply, but was ruled out of order.

The proceedings terminated with a paper by Mr. **William Tapley** (of the Geologcal Survey Office) on "The Influence of Geology on Health and the Districts of Disease."

At the conclusion, Sir **Henry Acland** made a few remarks on the extreme difficulty of the subject. As an example, he mentioned phthisis, and said that possibly its greater prevalence on damp soils might be due to the bacillus tuberculosis requiring such soils for their life and growth, so that geographical conditions would only in a secondary manner influence the prevalence of phthisis.

THE NATIONAL REGISTRATION OF PLUMBERS.

AT a special meeting of the Congress, held in the University of London, yesterday, to consider the subject of "the national registration of plumbers in relation to the public health," the following were present:—

The Lord Provosts of Edinburgh, Aberdeen, and Dundee, Professor Armstrong (Edinburgh University), Sir Chas. Cameron (Medical Officer of Health, Dublin), Dr. Geo. Buchanan (Medical Officer Local Government Board), P. Gordon Smith (Architect Local Government Board), Sir Henry Acland, Bart., K.C.B., Professor Corby, M.D. (Cork), Bailie Crawford (Chairman of the Health Committee, Glasgow), Dr. Matthew Hay (Aberdeen University), Professor W. H. Corfield, M.A., M.D., Sir Douglas Maclagan, M D. (Edinburgh University), and W. H. Bishop (Master), Sir P. Magnus, and John Smeaton (Court), representing the Worshipful Company of Plumbers, besides a large number of Mayors, Chairmen of Health and Sanitary Committees, medical officers of health, and other representatives of the chief cities and towns of Great Britain and Ireland.

The following resolution was moved by the LORD PROVOST OF EDINBURGH, seconded by Bailie CRAWFORD (Chairman of the Health Committee of the City of Glasgow), and supported by Sir CHAS. CAMERON, M.D. (Medical Officer of Health for the City of Dublin), and passed:—

"That this special meeting of the International Congress of Hygiene, assembled to consider the necessity for securing the great sanitary efficiency of the plumbers' work and drainage of dwelling houses and other buildings, desires to record its opinion that an organised and efficient system of registration of qualified plumbers is essential to the protection and preservation of the health of the community, and that such a system having been established in the chief cities and towns of Great Britain and Ireland by the joint action of the Worshipful Company of Plumbers, London, and the plumbers and sanitary authorities of those places, the time has now arrived when application should be made to Parliament for powers enabling a council of competent jurisdiction and authority to take measures for systematically promoting technical education among plumbers in all parts of the United Kingdom, and regulating the practice of those plumbers who are enrolled as registered plumbers."

GARDEN PARTIES.—Yesterday afternoon garden parties were given by Lord and Lady Wantage, at Carlton House Terrace, and by Sir Edwin Saunders, at Wimbledon.

DIVISION I., SECTION I, PREVENTIVE MEDICINE.—ADDITION TO THE PROGRAMME.—Dr. Sisley's paper on "The Prevention of the Spread of Epidemic Influenza" will be read to-day.

RECEPTION BY MRS. PRIESTLEY.—A ladies' reception was held last night by Mrs. Priestley in Bond Street, and was most successful. Some excellent music was provided, and the evening was a most successful one.

RECEPTION BY THE NATIONAL HEALTH SOCIETY.—During yesterday afternoon the lady members of the Congress were received by Miss Lankester, at the National Health Society, when many interesting adjuncts to nursing were shown. We regret the space will not allow us to dwell on the objects of a society which deserves the support of all hygienists.

PRESS CUTTINGS.—A CAUTION.—It is probable that many members of the Congress have received offers from press cutting agencies offering to send reports of their speeches, and the references to them which appear in the newspapers. We wish to caution all members not to pay any money in advance to any agency without making due inquiry.

DINNER GIVEN BY THE PUBLIC HEALTH MEDICAL SOCIETY IN HONOUR OF THE CONGRESS.

THIS was held yesterday evening at the Holborn Restaurant, Sir Charles A. Cameron, President, in the chair. Among the guests present were: Professor Pagliana, Dr. Brouardel, Professor Max Grüber, Professor de Meyer, Dr. Palmberg, Dr. le Gibert, Dr. Buchanan, F.R.S., Dr. Littlejohn, Dr. Russell (Glasgow), the Earl of Meath, Sheriff Foster, Professors Roy, R. W. Smith, Frankland, Grainger, Stewart, Pistor, Corfield, Wynter Blyth, Sir Douglas Galton, Mr. George Porter, Sir J. Heron Maxwell, Sir Fred. Abel, Sir P. Magnus, Sir D. Maclagan, and Drs. Reid (Stafford), Shirley Murphy, Thursfield, Kaye, Thresh, Whitelegge, and most of the chief Medical Officers of Health of both town and country.

Sir C. A. Cameron, after the usual loyal toasts, proposed the toast of "The Congress," and the toast was responded to by Dr. Brouardel, Max Grüber, and Sir Douglas Galton.

A number of distinguished foreigners, such as Brouardel, Max Grüber, Albert Palmberg, and others, were made honorary members of the Society. Sir Frederick Abel proposed the toast of "The Public Health Service," and Dr. Buchanan and Professor G. T. Brown responded. The toast of "Our Universities and the Medical Corporations" was proposed in eloquent terms by Professor R. W. Smith, and responded to by Professors W. Odling, F.R S., T. Grainger Stewart, and Dr. Grimshaw. The gathering was thoroughly representative, and must be considered as one of the most enjoyable and memorable incidents of the Congress.

CORRESPONDENCE.

TO THE EDITOR OF PUBLIC HEALTH.

SIR,—In your report of the discussion on quarantine, Section I., August 11th, I notice that you conclude by saying that Surgeon-General Cunningham summed up. He did so, however, for his own side of the subject only. It happens that I represented (however unworthily) the other side—that of limited quarantine, and I, too, summed up for my side. This should be mentioned I think, the more that I heard nothing throughout the proceedings to shake the views I expressed in my paper. The point of my rejoinder lay in a protest against "cholera" and "English and Indian local conditions" being spoken of as though they confirmed the whole matter. This is far from being the case, and this discussion, which has already lasted fifty years, will drag on until participation in it is confined to gentlemen of practical experience in executing quarantine measures.—I am, &c.,

J. ASHBURTON THOMPSON, M.D., D.P.H.,
Government of New South Wales.

CONVERSAZIONE AT THE ROYAL COLLEGE OF PHYSICIANS.—A conversazione was held last night at the Royal College of Physicians in honour of the members of the Congress. Members were most graciously received by Sir Andrew Clark, the President, and by Dr. Priestley and Dr. Sturges, Censors of the college. The reception took place in the Censors' room. The library was decorated for the occasion with national flags and pictures by Linnel, Dicksee, Briton Rivière, and a selection from the fine collection of Inchbold's pictures, kindly lent by Dr. Russell Reynolds. The splendid portrait of Sir Thomas Watson, by Mr. George Richmond, was removed for the occasion into the library, and justly received a place of honour opposite the entrance to the room. During the evening the string band of the Royal Artillery played in the hall.

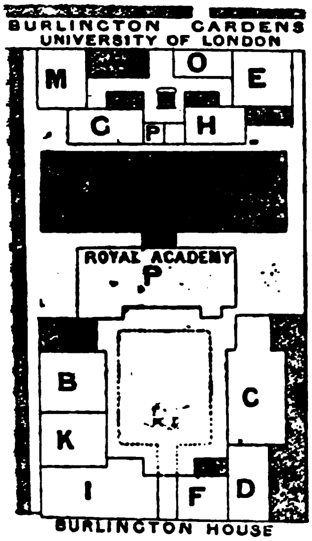
PUBLIC HEALTH,

THE OFFICIAL ORGAN of the CONGRESS of HYGIENE and DEMOGRAPHY, 1891,

AND

The Journal of the Society of Medical Officers of Health.

PLAN OF THE PLACES OF MEETING.



REFERENCES.

A. Opening Meeting. St. James' Hall.
B. Section 1. Preventive Medicine.—Antiquaries Society, Burlington House.
C. Section 2. Bacteriology.—Royal Society, Burlington House.
D. Section 3. Diseases of Animals.—Geological Society, Burlington House.
E. Section 4. Infancy and Childhood.—Theatre of the London University.
F. Section 5. Chemistry and Physics.—Chemical Society, Burlington House.
G. Section 6. Architecture.—West Examination Room, London University.
H. Section 7. Engineering.—East Examination Room, London University.
I. Section 8. Naval and Military.—Linnæan Society, Burlington House.
K. Section 9. State Hygiene.—Astronomical Society, Burlington House.
L. Section 10. Demography.—Museum of Geology.
M. Reception Room. Library, London University.
N. Ladies' Reception Room. Agnew's Gallery, Bond St.
O. Committee Room.
P. Press Room. Royal Academy of Arts.
" " London University.
" " Museum of Geology.
Q. Gibson and Diploma Galleries, Royal Academy of Arts.

PUBLIC HEALTH.—All communications and letters for PUBLIC HEALTH should be addressed to Professor Wynter Blyth, offices of PUBLIC HEALTH, Burlington House. Should the journal not be received after order, subscribers are requested to communicate direct with Messrs. Collingridge, 149, Aldersgate Street, E.C.

SEVENTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

THE work of the Congress was continued yesterday, and there seemed to be no abatement in the attendance of the members. All the sections without exception had good audiences.

DIVISION I.—HYGIENE.

SECTION I.—PREVENTIVE MEDICINE.

DISCUSSION ON THE USE AND ABUSE OF ALCOHOL.

A DISCUSSION upon the use and abuse of alcohol, and the measures to be taken for their regulation was the subject of to-day's debate.

Sir JOSEPH FAYRER called upon Sir Dyce Duckworth to open the debate.

Sir DYCE DUCKWORTH said that he felt that he approached the subject in a proper spirit in one way, for he was temperate in his views upon it. Our miserable national pre-eminence in the abuse of alcohol had naturally directed medical attention strongly to the subject, and Sir Dyce Duckworth was in a position to speak with a physician's experience to the effects of alcohol upon all classes of society in this country, and as one who had also studied the matter from an international point of view. The physician's temper must be the right one for such investigation; he had no bias, but trained powers of observation, broad charity, and, as a rule, he aimed at gathering facts before enunciating theories. It was not, he said, claimed for the medical profession that they enjoy a monopoly of these qualities, but to no body of men is such a spirit more necessary.

With some of the speaker's views other members of his profession might differ; with his broad conclusions he felt that they would all agree. The use of alcohol was not an unmixed evil, nay, it is actually beneficial; it was not the only form of excess—others are fraught with peril every whit as deadly to many classes; but alcohol brought in its train more general and widely spread evil, because its use to a degree was so bound up in our ordinary life, that we might as logically talk of abolishing bread and butter as alcohol.

He then considered the evidence for believing that the abuse of alcohol was on the increase, and pointed out that the enormous growth of our populations, the greater facilities for intercourse and inter-travel, and the great access of national wealth with consequent increase in the number of the idle and luxurious. Each and all must be considered. He believed that the abuse of alcohol was less prevalent than it formerly was. He added that our national pre-eminence in drunkenness was disputed, and quoted conclusions of Sir William Roberts that certain continental races actually beat us in the vice.

From the physician's point of view, then, the use of alcohol is no unmixed evil, and there was neither sense or propriety in the attitude of horror that was sometimes assumed towards the vice of drink. Alcohol had its social use and its medical use, and it was only where the individual abuse interferes with the common good, when, as Sir Andrew Clark has well said, "the law of the individual traverses that in general application to the mass," then only was it that interference can be called for. Most of us use a little alcohol, and many of those people who work without its assistance would in great probability work better if they took some. Some people could work entirely without alcohol, and felt no need for it; these had an idiosyncracy, and had no right to attempt to force the *régime* peculiar to themselves upon the world at large.

There was no evidence to show that the moderate use of alcohol was injurious, but the question at once arose, What is moderation? In Sir Dyce Duckworth's opinion from one ounce to one ounce and a-half of alcohol per diem—in whatever form it be taken—is sufficient for an adult. Children require none. This amount should be taken only with a meal, and preferably when the work is done. If the use of alcohol to this extent be not harmful, it is actually beneficial.

The attitude of the total abstainer towards such a proposition as the one he had just set before the meeting was hostile. The teetotaller believes that a man is only safe when he is a total abstainer, but in the speaker's opinion man is a finer animal than the teetotaller gives him credit for. Alcohol is a good gift to man—it is a good servant, but a bad master; but a man who is worth the name can guide himself by moral law, and can indulge to the legitimate degree any lawful appetite, without fear of ill results following such indulgence. Total abstention is for the use of the chronic drunkard. But the sale of alcohol to children under the age of puberty should be made penal.

For others it is too violent a measure to take for the benefit of weaker vessels. The habit of a certain amount of alcohol is woven in us, and in the present state of our civilisation is for our benefit, and it would be a serious thing to upset this nutritional rhythm. Alcohol is a good anæsthetic, a valuable food in sickness, and a great assistance to digestion, especially where food is coarse and ill-cooked.

Sir Dyce Duckworth then turned to the question of misuse, expressing himself in favour of a certain measure of local option. The examples of chronic drunkenness he classed under two heads: 1. The foolish, callous, vicious drunkard. 2. The victim of inherited or, in some cases, acquired nervous disease. Physicians alone can discriminate between these classes, but having done so, the treatment of the second class should be medical. They are the victims of a sort of mania. But the first class should be stringently treated. His vice should be stigmatised as a disgrace to him, in whatever class he may move. This now is so in all respectable circles; it should be the same in the lowest. The drunkard should lose his rights of franchise, and if it be found impossible to make him smart in conscience or self-esteem, he must be made to smart bodily. He deprecated a certain flabbiness now prevalent among us, manifesting itself in a great desire to mitigate punishment for crime.

Sir Dyce Duckworth concluded with an eloquent expression of his belief in the future, his trust in the spread of education, and the development of a higher national sentiment on the subject, and was proud to represent the feeling of his profession in saying that he had faith in the power of God working for good. In joining issue with those who say that total abstinence is necessary, "I give them," he said, "every honour for their enthusiasm. Better be earnest than be indifferent, but better far be free and sober." (Loud applause.)

After Sir Dyce Duckworth's paper, Sir Joseph Fayrer vacated the chair in favour of Professor PACCIOTTI, who said: I am an Italian, and speak English very badly. I thank you for the great honour you have done me and to my country in putting me in the chair when a subject of such world-wide importance is under discussion. I call upon

Professor WESTERGAARD, of Copenhagen, for his paper,

THE RELATION OF ALCOHOLISM TO PUBLIC HEALTH, AND THE METHODS TO BE ADOPTED FOR ITS PREVENTION.

Professor WESTERGAARD considered the difficulties arising from the imperfections of the statistics of the consumption of intoxicating liquors, and the effects of this consumption on public health, depended not only on the average quantity consumed per head of population, which is in many cases the only statistical fact at hand, but also on the distribution among the different elements of the population.

The extension of intemperance appears indirectly through certain social phenomena, such as divorces, the numbers of persons engaged in the liquor trade, the numbers of drunkards in poor-houses and lunatic asylums, and in the offences against the law caused by alcoholic excess.

The effects of habits of intemperance on health can be indirectly measured through the mortality in certain professions, such as publicans and beersellers. The experiences of life offices (*e.g.*, "The United Kingdom Temperance Institution") are instructive, if the investigations are sufficiently detailed and scientific. The average age of death of persons with different habits as to intoxicating liquors (Neison, Isambard Owen) is an imperfect measure, the average at death having no relation to the mean duration of life; but observations of the causes of death among such persons are very instructive, as well as the comparative numbers of temperate and intemperate persons. Observations on sickness and mortality from different causes, which directly or indirectly indicate alcoholic excess, as liver-disease (cirrhosis), delirium-tremens, and chronic alcoholism, are of value, and the statistics as to these two causes are in certain cases reliable. The number of suicides and the prevalence of pneumonia must also be considered.

The Professor then spoke as to private efforts for diminishing alcoholism, as public coffee-rooms, temperance societies, bands of hope, and in drunkards' homes for the cure of habitual inebriates, with or without State assistance. He mentioned also efforts to produce pure alcohol, and thought that there should be fines for adulteration of alcoholic drinks. He alluded to proposals as to declaring ebriates minors, and for punishing crimes committed in a state of drunkenness as severely as those committed in a sober state. He next passed to questions of excise and duties on intoxicating liquors. An increase of the excise and of duties seems to diminish the consumption, but not in proportion to the increase of duty. The State monopoly in Switzerland, leaving a part of the surplus to the cantons for the counteracting of alcoholism is reported to have had a good sanitary effect; this system has occasioned a decrease of consumption.

It is, he said, most important to render the access to spirituous liquors difficult. The prohibitory system (Maine-laws) against the manufacturing and selling of intoxicating liquors, but usually allowing the import and sale of the same in the "original packages" was not a good one. Several facts show that this system is ineffective, and that it tempts to a surreptitious liquor traffic. The same objections may partly be raised against the "local option" system, leaving to a town, a village, or a larger district of the country to vote for local prohibition, but fraud is more easily detected under this system. The third popular American system, the high licence system, seems to be more effective, as it lessens the opportunity for intemperance by reducing the number of drinking saloons, and causing those who pay the high licence to help the authorities in the conviction of breakers of the law. There were other methods. Limitation of the number of licences (Dutch system), and the Gothenburg system adopted in Sweden, Norway, and Finland. Under the latter system licences are given to companies, which are only allowed to give the shareholders a fixed rate of interest, leaving the surplus for the benefit of charitable institutions.

ıfessor Westergaard considered that a limitation of
ours during which the saloons are allowed to be
d is quite necessary, especially on Sundays, and
ed out that in Norway sale of spirits is forbidden
Saturday afternoon till Monday morning.

Milliet, of Berne, said that from the scientific
point the State had no right to interfere, and from
ractical standpoint it had no power to do so. He could
nd that there could be any objections, either religious
al, to the proper use of alcohol. But the excessive
ust be checked, and the people protected against
fender. He thought that a distinction should be
ı between the use of distilled liquors and the use of
nted liquors, as the latter produced so much less
, M. Milliet believed that measures of local option,
ommended by Sir Dyce Duckworth, might be of
use, and thought that the chief centres of drunken-
must always be small private drink-shops.

Norman Kerr, President of the Society for the
' of Inebriety, then made a strong speech in favour
al abstinence. Dr. Norman Kerr said that the loss
through alcoholism was appalling. He had esti-
l the number of deaths prematurely occurring in the
d Kingdom of Great Britain and Ireland every year
,000 from personal intemperance. To this direct
l premature fatality of 40,000 inebriates there must
ded double that number of deaths of individuals
ring, not directly from their own habits, but indi-
, through accident, violence, starvation, neglect, and
e. The average worth of an adult to the community
een reckoned at 2s. per day. He calculated that
premature deaths meant a loss of £6,260,000 to the
ı every year. The waste from alcoholic disease, over
bove the waste from alcoholic deaths, was most
s, and he put this loss to our national wealth during
nths from alcoholic intemperance at £2,880,000,
g out of the reckoning altogether the considerable
er of premature deaths and of attacks of non-fatal
lies arising from alcoholic indulgence in quantities
only called "moderate," "free," and "generous."
se expenses there must be added a large proportion
enditure on pauperism, the administration of justice,
olice, and other expensive charges. Still further,
was a mass of mental unsoundness, moral disorder,
ocial tumult. Looking yet further ahead, reading
ture from the experience of past and present, there
be discerned an enormous increase in the next and
ding generations of mental impairment, defective
l, paralysed will, and degraded *morale* from in-
d brain degeneration through the poisonous influence
ohol on parental organ and tissue. All this mischief
voidable. How could it be remedied? The remedial
s would require time, extending over several gene-
s, but the evil could be remedied. How could this
ne?

·By recognising inebriety (or, as Dr. Kerr had ven-
to call it, "narcomania," a mania for intoxication
por) as a disease, and drunkenness as very often but
ect or symptom of disease. A fair proportion of
ases, as the experience of the Dalrymple Home for
reatment of Inebriety and other similar hospitals
d, could be cured.

—By amended legislation (the existing Inebriates'
applying only to well-off inebriates voluntarily
g to be admitted to a licensed Retreat, under the
lding requirement of appearance before two justices)
ovide for (*a*) compulsory reception and retention of
iates too demoralised to apply of their own accord,
or reception of voluntary applicants on a simple
ment, without appearance before justices, (*c*) for
are and treatment of the poor and those of limited
s.

adoption of such urgently called for measures in the
sts of the individual, of the community, and of the
nistration of justice, though of vital importance, touched but the fringe of the subject. For the prevention of alcoholism in the future, a knowledge of the poisonous action of alcohol on body and on brain ought to form an integral part of education. Immunity from the physical, mental, moral, and social ravages wrought by alcoholism could be eventually secured only by general abstention from even the "limited" use of intoxicants; their exclusion from social, political, and sacred functions; and the scheduling of alcoholic beverages as a poison under the Pharmacy Acts, or by some other legislative enactment, the prohibition of their manufacture and common sale.

Sir **Joseph Fayrer** said that he would simply add the testimony of a physician of forty years' experience—chiefly in tropical climes—to the evils that may be produced by drink. He was no advocate of total abstinence, rather believing in Shakespeare's aphorism "Good wine is a good familiar creature"; but he did hold that principles of temperance should be most strongly inculcated and form part of every child's education and training. To totally interdict the sale of intoxicants would be illogical, in fact, it would be as absurd as to interdict the sale of food or opium because some men were gluttons and others opium-smokers. Every man must be a law to himself.

It was Sir Joseph Fayrer's duty often to speak words of counsel to young men leaving England for Indian employ, and without exactly advising abstinence to such, it was his habit to point out that the young man whose business lay in the tropics, who neither smoked nor drank, was in his opinion, doubly armed against the climate and its ills. But to middle-aged men, whose habits were formed, he said nothing to disturb those habits, so long as the amount taken was moderate, and attended by no ill result. He would, however, sometimes warn these that a need for the support of alcohol was sometimes one that grew insidiously and rapidly. In conclusion, he was glad to learn from so eminent an authority as Dr. Norman Kerr that cases of habitual drunkenness were not so hopelessly irreclaimable as was generally believed.

Professor Pacciotti here left the chair, in favour of Dr. **Walter Dixon**, who called upon Mr. **William Bingham** to read to the Section a paper contributed by Mr. J. J. Phillips.

[*This paper has been held over, pressure on our space making it impossible to print it in to-day's issue.*]

Dr. **Hewitt**, of Minnesota, gave briefly the experiences of an American health officer. He did not believe in direct interference, but he did in making the way of the drunkard difficult for him, and in putting out indirect inducements to sobriety. He thought the Maine law a failure, but spoke very favourably of the efforts of American ladies in the temperance cause.

Professor **Alligharr** followed. He said that there was no use to attempt to contest the fact that immense evil followed the abuse of alcohol, but he considered that all attempts to suppress its sale must be unsuccessful. He did not think that sufficient attention was paid to the fact that it was not the quantity of the liquor, but its quality, which generally did the mischief. There was a practical step that could be taken. The State might insist that the quality of drink supplied should be good.

This address was received with considerable applause.

Dr. **Kinhead**, who followed, said that he agreed with Dr. Norman Kerr that inebriety is a disease, and not a purely voluntary and moral offence. It followed, therefore, that legislation could be directed against it, whereas it was well-known that it was useless to attempt to legislate against moral offences. It has been considered to be the inalienable right of every Briton to get as drunk as he likes, when he likes, and where he likes, and the law cannot punish him unless he does some mischief. Such a law is cruel and silly. With regard to the taking of a pledge, he was not a great advocate of the value of such a proceeding. To keep the pledge when taken was a daily strain upon the will power, and it was this will-power that was so weak in these people, while a broken pledge was a shock to the moral system, which might lead to a worse state. The pledge is, however, useful and even necessary in (1) where a tendency has already developed for drink; (2) where the neurotic tendency—hereditary or otherwise—is believed to exist; (3) in the young, whose ideas and habits still have to be developed. He concluded by stating that he agreed with Sir Dyce Duckworth in his view that the sale of liquor to children should be penal; he thought that parental protection was often inefficient; punishment, he held to be proved to be no remedy for the vice; there should be asylums established for inebriates.

Dr. **Isambard Owen** said that his paper in the "British Medical Journal" had been mis quoted frequently, and that he had never arrived at the conclusion, indicated by the figures, that the total abstainer's life was a worse one than the chronic drunkard's; and Sir **Vincent Kennett Barrington**, in a very clear and able speech, spoke of the connection between drunkenness, lunacy, and idiotcy, and strongly upheld the Norwegian restriction system, which had transformed that country from the most drunken to the most sober nation in Europe.

The section met again at two p.m., Sir Joseph Fayrer in the chair, to hear a paper from Dr. Priestley, on "The Improvements in Modern Maternity Hospitals." Dr. Priestley proved by incontrovertible figures that aseptic precautions had saved thousands of lives of women in the prime of their usefulness.

Dr. **Graily Hewitt** related a case in support of Dr. Priestley's view. Mr. **Fowke** and Dr. **Edge** also spoke.

Dr. **van Doorenmaal**, of the Hague, read a paper on Ophthalmia, and this was followed by Dr. Sisley's paper on

The Prevention of the Spread of Influenza.

Dr. **Sisley** said: It is impossible to calculate with accuracy the number of deaths caused by an epidemic of influenza, because (1) during an epidemic many people who already suffer from organic diseases which would ultimately prove fatal die sooner than they otherwise would because they are not strong enough to overcome the depressing effects of influenza in addition to those of the pre-existing disease; (2) because it is common for diseases of the respiratory organs to follow attacks of influenza, and the maladies thus set up may not end fatally for weeks, months, or even years. But although no exact numerical representation of the mortality of influenza can be given, the number of deaths caused by the disease is undoubtedly great, and if anything can be done to prevent the spread of the disorder the subject is, I think, of sufficient importance to be worthy of the consideration of this Congress.

As a preliminary to the discussion of this question, it is necessary to consider how the disease arises and how it is spread.

I.—How does the disease arise? The origin of the influenza concerns us in England less than the spread of it, for except at Bedford Park, and even so far as that place is concerned on the authority of a single observer, I am not aware that influenza is supposed, by anyone, to be sporadic or endemic in any part of England. In China the disease occurs sporadically, and there is evidence that it is endemic. At Swatow, for example, sporadic cases of influenza are not uncommon, and in Mongolia the disease is well known. The epidemic which affected England in 1889-90 apparently originated in Bokhara in the summer of 1889, and came to us after affecting the inhabitants of the intervening countries, Russia, Germany, France.

II.—By what means did the disease reach us? How does it spread?. Is it contagious? Or is the poison air-borne? Can it be carried by parcels or by letters? These questions have long been discussed, but different answers are still given to them.

Many of the more observant of the older writers were of opinion that direct contagion played a great part in the spread of the malady, and as early as 1743 this idea was adopted by the Pope, who proclaimed a "land quarantine" to prevent its progress. I need not quote the familiar cases pointing to contagion which are given in Dr. Theophilus Thompson's well-known book, nor refer to the interesting record of Dr. Samuel Foart Simmons, for it is, of course, well known to all students of the subject that the doctrine of the spread of influenza by contagion has been held by successive generations of acute observers. Certain classical observations go to prove that, in some cases at least, the infection is carried through the air even over the sea; but this does not prove that the disease is not contagious, nor even that it is not very generally spread by direct contagion.

On this question there are two distinct branches of evidence which deserve separate consideration: 1. The geographical distribution of the disease. 2. The date and conditions of its first appearance in any place.

(1.) If the infection were always air-borne the disorder would spread presumably in a definite way. It would not go from one large town to another, and miss the intervening country. What actually happened in the last epidemic was, that the towns were affected first and the villages afterwards. A large town appeared to be the centre of infection for the surrounding country. The report of the Local Government Board will doubtless throw much light on this subject, by giving the exact or approximate date at which the disease appeared in every town and village.

Since the writing of this paper, which had to be sent in to this Section in March, the report of the Local Government Board has appeared, and in all the cases given there, as well as in the authoritative remarks of Drs. Parsons and Buchanan, the view that influenza is contagious is quite borne out. I shall take it, therefore, that this view is now generally held, and shall proceed to briefly discuss the preventive methods that may be used. The matter may conveniently be considered under three heads: (1) General Hygiene; (2) Prophylactics; (3) Avoidance of Infection.

I. General Hygiene.—It is important to notice that hygienic conditions check the spread of all epidemics. As Sir Joseph Fayrer has pointed out, experience proves that in the case of all epidemics "sanitary measures have the power of controlling or modifying if not of preventing them." This was abundantly shown in the late epidemic, and I have no doubt that London suffered less than some continental cities, because its general sanitary state was less unsatisfactory. Mr. E. A. Hunt, of Colchester, in a letter to me says that one of the things which struck him most about the late epidemic was the rapid spread of the disease under unhygienic conditions.

II. Prophylactics.—Quinine has been strongly recommended as a prophylactic for influenza, but its claim to be considered one is at least open to doubt, for cases of the disease have occurred in patients who were at the time taking full doses of the drug. Dr. Bezley Thorne recommended that the eyes of people exposed to infection should be bathed with a solution of boric acid, and found that none of those who adopted this practice suffered from the disease. A precaution so simple, founded on a scientific theory, and devoid of danger, merits more general adoption than it obtained during the last epidemic.

III. Avoidance of Infection.—Much may be done to prevent the spread of the disease by avoiding direct infection. It might be argued that the only way out of the (infected) air is into the grave, but this is to take an exaggerated view of the danger of the part played by the wind in the spread of the disease, and to ignore the fact of the contagious nature of the malady.

During the late epidemic the British matron was behind the tent-dwellers of Mongolia in her indifference to the health of her guests, for, as Mr. Gilmour tells us, influenza exists in Northern China the natives will the stranger, and say, "Dismount at my tent r time." In England, parties often took place as whilst the family of the host was suffering from sorder. I wish to insist on the fact that no one ng from the disease has a right to spread it to , and that the hospitality of an infected house is to ided. Aged people, and these in delicate health, avoid all contact with patients who have influenza, as a precautionary measure, letters and parcels be disinfected.

in, in the case of public institutions, great care be taken not to introduce the disease from with- During the late epidemic Dr. Clemow found that at rood, although over a quarter of the total number attendants who did not live in the asylum suffered nfluenza, none of the inmates suffered. At Broad- on the training ship "Mount Edgcumbe," and at yal Asylum, Morningside, the disease when once uced spread freely.

nentary schools should be shut up in the case of an nic, and medical officers of health should be at once ed of any outbreak. An interesting paper by Dr. h, of Chelmsford, shows how this plain duty has neglected by school managers, and with what .

Weaver spoke to the value of Ferric periodate as tive drug. He was reminded that the section was rentive" Medicine, and added that Ferric periodate remarkable prophylactic.

Felkin spoke to the place origin of the disease, and **Joseph Fayrer** hoped that people would preserve udgment as to the contagion theory. He thought ible that it might later be shown that the disease ome other than one specific originating and com- able cause.

SECTION II.—BACTERIOLOGY.

Discussion on Tuberculosis.

President, Sir J. **Lister**, took the chair at ten a.m. **President** remarked that Sir Nigel Kingscote, the lent of Section III., was unable to attend the con- discussion on Tuberculosis, to be held in the rooms tion II., and that Sir Joseph Lister had been asked e the presidentship of the combined meeting. The lent remarked that tuberculosis in respect to food ansmissability was one of the most important sub- of the Congress, and he called upon

fessor **Burdon Saunderson** to open it by reading per. In the course of his remarks he said he would principally on the etiology of tuberculosis, which not be so interesting as yesterday's discussion. are two branches of study—I., pathological or gical; II., practical, or the uses to which the know- given by I. can be put. There are several points might be accepted as fact before proceeding, such as istence of the tubercle bacillus. The identity of bovine uman tubercle, and the existence of danger in the tuberculous meat. There are two questions which : 1. That of inheritance, and its effect in the pro- on of tuberculosis. 2. What are the channels of nce of the tubercle bacillus. The first will not now scussed. Concerning the second, the bacilli may by the lungs or intestine. Protection may be d in reference to the individual or the community. an referred to the conclusions of the recent Paris rence on tuberculous meat. Arloing showed that every six carcases of beef one was tuberculous, so f 1,000 carcases were eaten there would be danger ection in over 100. It must yet be proved that if d not eat tuberculous meat we should be free from culosis. Chauveau and Baumgarten were the first to attention to the danger of eating tuberculous meat. garten showed that tuberculosis was primarily an ion of the lymphatic system. We still are in want of more experimental research. It was no answer to say that the dangers of tubercle infection were exaggerated. If it is true they existed, they could not be exaggerated. From statistics it is shown that 14 per cent. of deaths are due to tuberculosis. The deaths are found principally in infancy, before four years, and between 20 and 30 years. In ordinary phthisis the lungs are primarily affected, no matter where the infection is introduced. In experiments with animals, if the tubercle material is inoculated under the skin the lungs are the first part affected. It is thus seen that although the infection is first absorbed by the gastro-intestinal tract, the lungs may be the first parts affected. Tubercle of the intestine does not occur primarily, but it does secondarily in the adult. It can often be traced from the lungs along the larynx to the intestines. In childhood the case is different. So far this branch has not been sufficiently studied. Where systematic bacteriological observations have been carried on in children's hospitals statistics show that nearly one-third of the deaths are accompanied by tuberculous lesions. The lymphatic glands are first affected, afterwards the bones. The reason that measles and whooping-cough are so frequently followed by tuberculosis is probably that the subject has already tuberculosis of the lymphatic system, and the broncho-pneumonia following easily becomes tuberculosis. These cryptogenetic tuberculous affections must be put down to conditions present before birth. As regards the consumption of tuberculous meat, it may be maintained that it is dangerous, but if we had a law to-morrow to forbid the sale of tuberculosis meat it would entail great expense, as we must have some one scientifically trained to correctly diagnose the condition; everything depends on the diagnosis. The veterinary surgeon is not competent to make what the French call the "diagnose précise." The judge must have a scientific education and a special technical skill, just as the tea-taster must have a special training.

Conclusions.—There are not facts enough as yet to say definitely that tubercle taken by the intestine produce gen. tub., but in children tubercles of the intestine are followed by tubercle of the glands and the bones, so that we may infer that the same may occur in the adult; but we are in great want of more experimental research. More evidence is wanting as to the cause of tubercle in infancy. As regards Government administration, the reader advises a strict system of inspection extending over the whole country, acting equally in different parts. Tubercle should be included in the Infectious Diseases Prevention Act. We still want information as to the actual prevalence of tubercle. About five per 1,000 cattle are generally condemned as tuberculous. This involves compensation, which will require extra taxes (which would be very small) to be levied.

Professor **Bang** (of Copenhagen) then read a paper

On the alleged Danger of consuming the apparently Healthy Meat and Milk of Tuberculous Animals.

The great majority of investigators agree that the essential source of tuberculosis in man is to be found in man himself; but nearly all admit that man can contract the malady by the ingestion of meat or milk from animals affected by tuberculosis. As to the extent of this danger opinions differ. In France, a Presidential decree has forbidden the sale and use of milk from tuberculous cows; but Professor Bang regards the application of these meat sures as impossible in countries where tuberculosis is prevalent; and, moreover, they do not seem to him to be necessary. Professor Bang describes a number of experiments which he has made on this subject with tuberculous cows. Of 58 cows whose milk was inoculated into rabbits and guinea-pigs, there were nine in which the milk proved virulent. On the whole, he thinks the milk of a tuberculous cow with udders apparently healthy is not in the great majority of cases dangerous, though it is undoubtedly so sometimes, and is always suspicious. As to meat, Professor Bang thinks the experiments by others show that the muscular tissue is so unfavourable a nidus for the tubercle bacilli that they do not multiply in it. The number of bacilli found in the meat of tuberculous animals must always be very limited. A series of experiments which Professor Bang has made upon the virulence of the blood of 20 cows extremely tuberculous gave negative results in 18 cases, and positive results in two cases only. He thinks the seizure of the meat of every tuberculous animal too severe a measure. So long as the tuberculosis is strictly localised the meat is not a source of danger. Where the malady is generalised, the consumption of the meat may be dangerous, although it is not so always. The eating of under-cooked meat should be discouraged; but the best means of avoiding danger to the health of man is to take all possible measures for preventing the propagation of tuberculosis amongst our domestic animals.

Professor Bang also spoke of the necessity of raising the temperature of milk sufficiently to kill tuberculous bacilli before manufacturing it into cream or buter.

Professor Arloing said the question of transmissibility of tuberculosis from animals to man was of very great importance, but that the "diagnose précise" was very difficult. The danger to children of drinking milk from tuberculous cows was great. He was decided in his views concerning the total condemnation of tuberculous meat, and criticised strongly Dr. Bang's views thereon. He thought all tuberculous animals dangerous to health, and that meat was often under-cooked and the bacilli left pathogenic. He then read some statistics in support of his view. In conclusion, he advocated a strict inspection, not only of large towns, but also of all the smaller centres of population.

On the Transmission of Tuberculosis from Animals to Man by means of Flesh and Milk derived from Tuberculous Animals.

By Professor McFadyean and G. Sims Woodhead, M.D., &c.

The evidence as to the transmission through the flesh of tuberculous animals is very conflicting, apparently in great part because the methods used are different and the conditions are not uniform. Do human beings ever contract tuberculosis through the ingestion of tubercular material derived from the lower animals? As the result of a large number of observations made on tuberculosis in children, we think this question can probably be answered in the affirmative. Is the flesh of tuberculous animals capable of setting up tuberculosis (*a*) when introduced *en masse*, (*b*) when the expressed juice only is exhibited? Our experiments go to prove that the juice only does not, in most cases, contain a sufficiently large number of bacilli to set up tubercle, even when inoculated into small rodents, but from the fact that we have observed tuberculous masses in the muscles of the buttock of tuberculous cattle, we must accept the fact that tubercle bacilli may sometimes, perhaps rarely, be present in considerable numbers in this position. Of three cows slaughtered on one day at one slaughter-house, well-defined tubercle was found in the muscles of the buttocks of two animals; in one of these there was tuberculosis in almost every organ and part of the body; in the other there were only a few nodules in the lung and in some of the glands, there was certainly no pleural or peritoneal tubercle, and all the other organs were unaffected—a very important case. The records of a number of positive feeding experiments made by various observers go still further to prove that tubercle bacilli are actually, in certain cases, present in the muscles or in the intermuscular connective tissue, and are there a possible, though perhaps a comparatively rare, source of danger. A résumé of our own and previous experiments indicates that this source of danger is not frequently present, but that it may exist in a certain proportion of cases.

Milk.—Hitherto too little attention has been paid to this subject in this country: this has been the outcome of our inability to diagnose with certainty the presence of the earlier styles of tuberculosis in cattle. We consider that the conditions of the udder in tuberculous cows and of the conditions under which tubercle bacilli are found in milk should be more carefully studied, and that there is a necessity for thorough and frequent examination of all dairy cattle, because of the rapidity of the onset of tuberculous disease in the udder.

Tubercle bacilli in milk.—There is a relation of numbers in the milk to virulence of affection in inoculated animals. A bactericidal action of milk on tubercle bacilli is not yet proved. Bang points out that different results have been obtained in different cases by various observers, because they have experimented on different animals.

There is a necessity for drawing special attention to this subject, as it is now agreed that although in the later stages tubercular mammitis is readily diagnosed, there appears to be a period during which it is clinically impossible to make it out (except by inoculation of small animals); at this stage tubercle bacilli are present in the milk in very small numbers, though in sufficient numbers to render the consumption of such milk dangerous for weakly children.

Professor McFadyean also remarked that the danger of tuberculous milk was diminished by dilution with sound milk. He thought there was great necessity for a fortnightly inspection of milch cows by a veterinary surgeon. No phthisical patient should be in a dairy. The question as to the danger of eating meat from a tuberculous cow must still be answered, as many thought it to be a local disease. The main cause of tuberculosis was from animals. His paper was cut short from want of time, but in the main he agreed with Dr. Bang, but he has not yet sufficient evidence to be decided on the question of total seizure of meat.

Professor Hamilton (Aberdeen) said there were two principal localities of the tubercle—the gastro-intestinal tract and the lungs, also local tubercle. (1) Tubercular pneumonia, where the air vesicles were the primary seat of infection probably brought about by inhalation. (2) Miliary eruption. (3) Lymphatic vessels. In the gastro-intestinal tubercle the lesion may accompany ordinary phthisis, or, contrary to the opinion of Dr. B. Sanderson, it may be primary; or it may be seen in children. Isolated tubercular deposits also exist. When in the lung previous catarrh need not exist, but it is a predisposing cause, as it loosens the protective covering. If tubercle follows whooping cough, etc., it is probably due to pre-existing caseous spots; or the glands weakened by the disease fall an easy prey to the tubercle. He asked for an explanation of the immunity from tubercle enjoyed by the pericardium and stomach.

Professor Nocard (Paris) does not think sufficient proof exists that ingestion of tuberculous material causes tuberculosis; he wants to see more positive experiment, the greater number of which are negative. He thinks tuberculous material more dangerous for children.

Dr. Hime (Bradford) was glad to see our foreign friends, who are not hampered as we are in making experiments, agreeing in the main with us. He thinks we are likely to run wild about the total seizure of tuberculous meat. In no country does a total seizure law exist as it is proposed to adopt here in England. In England inspection itself is worse than any other country. Professor Lingard, in an official report, spoke only of tubercle being transmitted by caseous material, and not by meat from a tuberculous cow. Koch says there is danger only when tuberculous meat itself is eaten. Infection by milk is proved. Phthisis is infectious and contagious between man and man.

Dr. Barlow (London), speaking from a clinical point of view, was not able to endorse experimental researches. As regards tuberculosis in children we must keep our minds open. The post-mortems in children's hospitals show enormous frequency of tuberculosis. The evidence of milk and meat in the production of tuberculosis was small. We must not forget other sanitary precautions ,which he looks on as of prime importance. The use of raw meat juice is dangerous.

Dr. Perronciti said spontaneous tubercle was impossible in the pig.

Dr. Burden Saunderson, in reply, said he was pleased to see that the difference of opinion was so small. All agreed that inspection was necessary, and in the difficulty of diagnosis.

M. Arloing was alone in his opinion as to total seizure. He proposed that "The etiology of tubercular disease of early infancy between three months and five years" be referred for discussion at the next Congress.

This was seconded by Dr. Septimus Gibbon, and carried unanimously.

The President was pleased to find that spontaneous tubercle was never seen in the sheep and pig, as we could eat those in safety.

Dr. Metchnikoff and Dr. Roux's conjoint paper was read by the former, who demonstrated his remarks by some beautiful drawings illustrating the cause of resistance to tubercle shown by some. This was by the formation of concentric rings of hardened inflammatory tissue forming round the bacilli, eventually absorbing them. These in time get calcareous.

Professor Ehrlich now proceeded to give Koch's views regarding tuberculin, up to the present time reporting some wonderful results which have not been obtained by anyone else throughout the world. The pure active principle has been abstracted, which produces local action.

Professor Ehrlich's paper was entitled

Koch's New Method of Treating Tuberculosis.

It is generally acknowledged that the principle of cure resides in the local effects which tuberculin exercises on the specifically affected tissues. The violent inflammatory reaction passing to necrosis is neither desirable nor necessary, but, on the contrary, light and gradually repeated stimuli producing cicatrisation of the tuberculous centres is what is to be desired. The essence of this method of treatment is to retain the specific excitation of the tissues as long as possible, and not to annihilate it, as with large doses is the case. The methods of Moritz, Biedert, Guttmann, Langenbrich were described by the author, all of which are based upon the application of small but repeated doses of gradually increasing strength. The advantages of these processes are that the undesirable inflammatory effects of the remedy are avoided. It is specially to be noted that the pathological signs found from tuberculin are produced by large doses.

Professor Cornil (Paris) proceeded to give his experience of tuberculin as a heroic and dangerous remedy, about which we as yet know little, and we run great danger of causing a catastrophe. He then spoke of the danger of disseminating an otherwise localised tuberculosis.

Dr. Bardach (Odessa) related his experiences of its use, which were not favourable.

Dr. Hunter remarked on the great differences between Koch's experience and that of others. He described experiments to show the nature of the active principle of tuberculin. He succeeded in isolating: 1. Which gave fever and no local action. 2. Which gave local action and no fever. 3. Which gave neither, but had the remedial effect.

Professor Ehrlich, in replying, remarked that a patient can be gradually brought to bear large doses without any danger.

Dr. Penfick and Professor Hueppe gave their experiences, and the President summed up in a few words, hoping that in time we might be able to obtain the wonderful results that Professor Ehrlich had described.

SECTION III.—RELATION OF DISEASES OF ANIMALS TO THOSE OF MEN.

This Section met at ten a.m., under the presidency of Sir Nigel Kingscote.

The following paper was read by Dr. Ostertag, of Berlin:—

Regulation of the Milk Supply with Reference to Diseases Transmissible by Milk.

Most countries have till now paid but slight attention to the sanitary question of the milk supply, and have contented themselves with forbidding the sale of adulterated milk or of milk from diseased animals, without taking proper steps to ensure obedience to their orders. A praiseworthy exception to this is to be found in the Italian law of provision supplies of August 3rd, 1890.

It is the undeniable duty of the State to see that only pure milk enters the market. The consumer is not in a position to guard himself against the manifold dangers which attend the consumption of milk. Milk may contain the most harmful ingredients, in spite of white colour and sweet taste. Such milk can only be banished from the market if the milk supply is controlled by Government officials. Only pure milk can be tolerated in the market; that is, milk obtained with the greatest cleanliness from healthy animals, and possessing normal physical qualities and a certain degree of strength. For sanitary reasons the following kinds of milks must be excluded from the market:—

1. Milk which, without being necessarily prejudicial to health, is peculiar in colour, taste, or consistence [nauseous milk].

2. All milk that is prejudicial to health, or which is suspected on good grounds of being so.

To the first group belongs colostral milk, blue, red, and yellow milk; further, slimy, thready, bitter, salt, as well as abnormally smelling milk, and milk that has been made impure by mud or other substances. The milk of animals that have been fed on poisonous fodder, or that have been treated with certain medicaments, and of those suffering from tuberculosis, malignant pustule, cow-pox, aphthæ, or generally ill in consequence of some process inducing ulceration or ichor, must be regarded as prejudicial to health. The possibility of milk being of a hurtful nature is suggested in all the other feverish ailments common to milk-yielding animals, as also by the different forms of inflammation of the udder. Again, milk which has already been drawn may become infected by immediate contact with sick persons (typhus, cholera, etc.), or through being kept in rooms where such persons are. Finally, through being carried in unsuitable (metal) vessels, injurious substances may find their way into the milk.

In order to guard against these dangers it is requisite (1) that all dairy farms be licensed; (2) that all animals kept for milking be examined by a veterinary surgeon from time to time; (3) that the owners of dairy farms be bound to provide only good undamaged fodder; further, to give immediate notice of the illness of any milch cow to the attending veterinary surgeon, and, until he gives leave, not to send the milk of the diseased animal to market; (4) that the business of milking be performed with the most punctilious cleanliness, and that no person suffering from any infectious illness be employed to milk; (5) that the mixed milk obtained by milking be cooled and stored in special rooms, not in living or sleeping rooms; (6) that it be transported only in suitable vessels; (7) that during the prevalence of aphthæ only boiled milk be brought into the market, whilst all milk which must be considered nauseous or injurious be excluded from the provision market. Likewise, at the outbreak of any epidemic in a house where dairy farming is carried on, the sale of milk be forbidden. (8) In obtaining the so-called "milk for children," especially strict regulations must be carried out as to the feeding of the milch cows, cleanliness in milking, and the cooling and proper mode of transport of the milk.

Dr. **Vacher** (Birkenhead) said that the first statement of Professor Ostertag that "most countries have till now paid but slight attention to the sanitary question of the milk supply is perhaps more true applied to other countries than England. We have had regulations for some time, and when these have efficiently been put in force, much good has been done. We have the Contagious Diseases (Animals) Act and the Law of Food and Drugs Act. In my own district we have a register of the milk shops and dairies in the district, which includes the source of supply if that is without the district. In an inquiry conducted by the speaker, 312 samples of milk were examined, and a tract was issued and supplied gratis, to all interested in the trade, which contained an account of the rules and regulations in force. For convenience, Dr. Vacher would divide defective milk into three classes: First, milk made defective by being skimmed and watered; second, milk infected with bacteria. This would include what was known as blue and red milk, but these conditions are probably rare, as in an experience of seventeen years blue milk was only once noticed among the samples, and red milk was never seen. In the second class would be included also milk from animals suffering from foot and mouth disease and tubercle. As we receive reports of all animals suffering from the first disease, the sale of milk from them is easily prevented, but tubercle is not yet scheduled, and attention is drawn to the fact that though the milk from the first-mentioned condition only gives rise to a slight local disease, while in the case of the more serious malady, tubercle, we have not the necessary information or powers. In the same class is the milk from animals suffering from cow-pox and mastitis. I have only seen two cases of cow-pox in seventeen years, and in mastitis the milk is not generally in such a condition as to be marketable. 3rd class. Milk infected with human disease. The two typical diseases connected with this class are scarlet fever and diphtheria. In Birkenhead they have had local regulations since 1882 giving power to close all dairies and milk shops where these diseases are present, and also to demand a list of all customers supplied with milk. To deal effectively with the subject, the main things required are (*a*) registration and licence of all dairy farms and milk shops; (*b*) efficient inspection, including that of a properly qualified veterinary surgeon; and (*c*) advice should be given to the public to boil the milk before using. In Germany this is the regular custom, and people no more think of taking raw milk than raw beef or pork.

Professor **Brown** said: In the discussion yesterday some speakers complained of the tendency to ascribe all sorts of diseases to the hardly-used cow, but no one questions that milk is subject to a large amount of contamination after being drawn from the animal. It is contaminated by dirt, by excreta of animals in consequence of the unfortunate position of the udder, and by inflammatory products from almost every disease to which the cow is subject. I have never found on examining the milk from a diseased animal that it was free from morbid products. I do not speak of bacteria, for I have recently isolated from the milk collected, with antiseptic precautions, from a perfectly healthy cow no less than thirteen different micro-organisms. These organisms are presumably innocuous. Contamination may also take place from animals suffering from mammitis, and in proof of the ignorance of any intention of doing harm on the part of the milk supplier, I may mention that a case was noticed by one of my officials, when, in his presence, a man proceeded to milk from a part of the udder when nothing but pure pus came, the milker being much surprised to hear that there was any reason why he should not, evidently looking upon the deep yellow colour as a proof of extra richness in the sample, which would, when mixed with the rest, improve the general quality. Milk may also be contaminated by specific diseases, as pleuro pneumonia, tubercle, and foot and mouth disease. With respect to the latter disease, when Dr. Vacher mentioned it, he must be referring to a past period, as he was glad to say we had had none since 1866. The means of protecting the public in Dr. Vacher's town were admirable. But he was sorry to say that imitation of them was not general, and in many towns no attempts were made to make or enforce regulations. There was no doubt, when one saw the filthy surroundings of many dairy farms, some regulations were required; but the experience of his department was, that it was impossible to induce local authorities to take advantage of their powers, and when control of the matter was handed over to the Local Government Board, he believed the same difficulty existed, and still exists. For effective carrying out of reforms, there is no doubt some system of compensation is necessary; it is a hardship to the individual when his business is suddenly stopped, and no compensation can be legally given to him. The law is seriously defective on this point. Boiling milk has long been urged as a preventative measure, but there is a prejudice against it, children in particular objecting to its taste. Quite recently he copied a paragraph from the *North British Agriculturist*, which stated that a German bacteriologist had proved that milk was a powerful microbe killer; this statement, which was opposed to our previous ideas, was given for what it was worth, Professor Brown not being aware how far it was sanctioned by other observers.

Dr. **Armstrong** (Newcastle) said: While complimenting Professor Ostertag on his paper he wished to point out that when he referred to milk as a spreader of typhus it included, according to continental custom, typhoid, which differs from the use of the word in England. He was quite in accord with the author of the paper on the question of licensing dairy farms, and had advised Newcastle to apply for the necessary powers to deal with it. Every town should have means of securing that milk is not contaminated. In an outbreak which he investigated many years ago where typhoid fever was traced to the milk supply, he found that the water supply of the farm was drawn from beneath the farmyard midden, and though the water was said to be used only for cooling the milk, he elicited that from defects in the hose several gallons of the polluted water had been allowed to mix with the milk. In all cases the authority ought to have power to refuse a licence if the dairy and its surroundings were not sanitarily satisfactory. Dr. Armstrong also thought that the list of scheduled diseases ought to be added to, and that milk from animals affected with tubercle or parturient fever should not be sold. Inspection should include a report from a veterinary surgeon, whose fees should be paid in the same way as medical men's now are. In 1879, when examining milk microscopically, he found evidence that colostrum from recently calved cows had been added to the milk by dairymen; this has an injurious effect by acting as a purgative on children, and should not be sold. His great reason for wishing tubercle included was that milk which was generally taken raw was much more likely to spread the disease than meat. He quite agreed with Professor Brown that most towns were negligent of their duties in the matter, but he took some credit to himself for persistently drawing attention to the subject, and he had advised the authorities in Newcastle to insist upon 800 cubic feet of air space for each animal in the cowshed at a time when his recommendations were exposed to ridicule, and it was stated that his next step would be to make "cowhouses into drawing rooms and supply silk stockings for the cattle." The compensation to small dairy keepers was only fair, and he had no wish to be unfair to any section of the community. In his opinion the public safety was better secured by the trade being carried on in a large way. Large dairies were more open to inspection, and it was to the interest of those engaged in them to gain public confidence by efficient management. As far back as 1882 he was the first to apply to Parliament for, and obtain what had now become so general, powers to demand a list of the customers supplied from any suspected dairy. Boiling milk before using it was never likely to become popular, and some other steps are absolutely necessary to protect the public.

The discussion was continued by Professor Perroncito, Dr. Fleming, Dr. Robinson (Dover), and Dr. Sargent (Lancashire).

SECTION IV.—INFANCY, CHILDHOOD, AND SCHOOL LIFE.

AT the beginning of the proceedings Dr. PASTEUR read out a list of the works presented to the Congress, as follows: Dr. Ruborn, "Cours d'Hygiène Générale et Pédagogique"; Dr. Roussel, "Rapport relative à la protection des enfants du premier âge, et en particulier des nourrissons"; two volumes of "Rapports notes et documents sur la protection et l'éducation des enfants abandonnés, délaissés on maltraités en divers états."

Then a paper was read on

NEGLECTED CHILDREN IN OUR TOWNS AND CITIES

by WILLIAM MITCHELL, Vice-Chairman of the School Board of Glasgow, Dr. Roussel being in the chair meanwhile. Mr. Mitchell said: I presume it will be admitted that there are neglected children in every town and city of the United Kingdom. There are neglected children in the charmed circle of the upper ten as well as in the poverty-stricken haunts of the submerged tenth. My present paper is limited, however, by the programme to some consideration of the evils attending the latter class. Of these, so far as numbers are concerned, it may be enough to say there are hundreds in every town, and thousands in every city. It is scarcely necessary to describe them; they cannot be hid. One meets them at every turn. Ill-clad, ill-fed, ill-conditioned, in alleys, in cellars, in lanes, in back-courts, in public thoroughfares—at markets, bazaars, and railway stations—selling papers and matches—playing at pitch and toss, gambling at cards, touting for parcels to carry, and up to any mischief.

As to their dwellings, they have all some corner called home, and every child of school age some parent or guardian who recognises responsibility. Let me glance at some of the so-called homes. Frequent reference has been made to the unprecedentedly large number of single room dwellings in Glasgow—numbering over 40,000. What that means when such single rooms are the abodes of a moderately-sized family I leave you to judge. Take, for example, a room of 12 ft. by 12 ft., where reside father, mother, and half-a-dozen or more children of all ages. There may be two beds in the room, under which are hidden certain shakedown materials to be drawn out at night and laid on the floor.

In this single room the whole family board and lodge, cook their meals, perform their ablutions, dress and undress, while mothers, of course, attend to all the necessary claims of their young and infant children. The evil is too often aggravated by the admission of lodgers not belonging to the family.

The remedies may be described as legislative, social, or individual.

Of legislative measures which are desirable, let me take special note of one which might be framed to deal with one-room dwellings. Lest I should alarm the timid, let me say at once I am quite aware of circumstances where for suitable inmates a single room dwelling may be as healthy and happy an abode as a palace with countless apartments, and with such I have no desire to meddle, but I do wish Parliament to interfere with the present indecent and scandalous practice of a parent lodging his adult children, boys and girls, with himself and his wife, in a single apartment.

The Education Act declares it to be the duty of every parent to provide suitable education for his child, and enacts severe penalties in the event of failure. In similar terms I would suggest that a law be framed declaring that it shall be the duty of every parent to provide suitable and decent lodging for his children, and in no case shall girls over twelve years of age and boys over thirteen years of age, being of the same family, lodge with their parents in a single apartment. If, in such circumstances, the parent is unable from poverty to provide sufficient lodging, application may be made to some properly constituted authority, and it shall be the duty of the said authority to pay the additional sum required when satisfied of the inability of the parent.

Let it be understood once for all, and by all classes, that it is not only a shame, but a criminal offence for girls and boys over twelve years of age, of the same family, to lodge with their parents in the same apartment, and a deadly blow will be struck at a hydra of immorality and impurity which at present disgraces certain of the lower districts of our towns and cities.

In Glasgow the School Board have always recognised the close connection between sanitation and education, and aided the Town Council last year in procuring an Act giving the magistrates stringent powers to deal with insanitary dwellings, and enabling them summarily to shut up those which were considered uninhabitable.

Its provisions have proved so effective that already certain wretched houses have been condemned and are being cleared away.

The question, however, regarding the scandal of grown-up children lodging together with their parents in a single room is one which is not local but national, and will never be settled until taken up by an outcry proceeding from the whole country.

Passing from this phase of the subject, let me say that the social remedial agencies which have been set on foot in our towns and cities in other directions, on behalf of neglected children, are very numerous and very valuable.

Here the author summarised the philanthropic institutions of Glasgow available for children, such as free dinners, medical missions, day industrial schools, etc., and he said that what was chiefly wanted is hearty recognition of such agencies—taking full advantage of them—bringing the children into touch with them—and it is here that individual effort comes in.

At the close of his paper Mr. MITCHELL proposed: "That a law be framed declaring that it shall be the duty of every parent to provide suitable and decent lodgings for his children, and that in no case shall girls over 12 years of age, and boys over 13 years of age, lodge habitually with their parents or guardians in a single apartment. If the parent is unable from poverty to provide sufficient lodging, application may be made to some properly constituted authority, and it shall be the duty of the said authority to pay the additional sum required, when satisfied of the inability of the parent to do so. The infringement of this law to be visited by suitable penalties."

Not being seconded, the resolution dropped.

Miss DAVENPORT HILL, whose appearance was loudly applauded, said she could hardly agree with Mr. Mitchell's remedies; in all probability the societies for providing free dinners, medical attendance, etc., to children might increase the very evils which they desired to avoid. Such institutions took away the responsibility from the parents, which is a very dangerous thing to do. (Applause.) They all liked to see children looking happy and bright; but if by feeding them they produced others to be fed they would be doing serious mischief where they sought to do good. (Hear, hear, and applause.) It is far more difficult to find remedies than to see the evil of these things, but every effort they could put forth to make the parents do their duty to their children was really a very important step in their work. It was found that children going to school when they see other children more neat and clean than themselves go home and exert a powerful influence on their parents in the direction of causing them to send them to school clean and well dressed, and the parents go less to the public-house, all of which shows that they are trying to do good and their duty to their children by going without something which they like, and in this direct way we can do a great deal of good to both children and parents. She remembered the case of one boy who was in University College Hospital with a very bad skin disease; and when the sisters and nurses knew that he had been in prison six times for stealing they were afraid that he would steal from the other patients. But he never gave them any trouble at all—he had only stolen before on account of his bad home and surroundings, and he is now the trusty servant of a baker, and he does not steal at all. When children leave the schools with which the speaker is connected, what they suffer from most is their parents. When they are sixteen years of age the school had no more power over them, and when their parents find that they can work they come to the school to see when they are going to leave, and then they drag them back to their bad homes, and the want is powers to prevent them doing so, and when they had these powers they could send the children to good situations.

There was prolonged applause at the close of Miss Davenport Hill's remarks.

Mr. G. MARGERISON'S remarks were directed to the paper of Mr. Mitchell, who had emphasised the evils which result from boys and girls over twelve years of age living in a single room with their parents or guardians, and who had suggested that the law should make it compulsory for parents to find the necessary and decent separate lodging. He (the speaker) wished to point out that the sanitary authority of the City of London, at any rate, has the power now to enforce these requirements by Rule 96 of the Public Health Bill, which enacts that every sanitary authority shall make and enforce such bye-laws, fixing the number of persons in a house which is let in lodgings, or occupied by the members of more than one family. It would be very hard on these poor people to tell them they must take another room; many of them have not the money to do it, and it would simply put them to the expense of migrating to another district where the sanitary bye-laws were not so strictly enforced. With the latter part of Mr. Mitchell's resolution he could heartily agree, and he proposed that that part only be presented as the resolution.

This motion, not being seconded, dropped.

Dr. THOS. GRIMSHAW (Registrar-General for Ireland) said that in Ireland the difficulty was not a want of power in making or enforcing such a law, but want of means to provide houses for those who would have to take more rooms than they had. They would have to migrate out of Dublin altogether. He thought that unworthy parents should be interfered with by the strong arm of the law.

Mr. LLOYD BAKER said he thought that the mechanical separation of rooms had less to do with morality than was supposed. The Northumbrian peasants were noted for their morality, and, as a rule, the whole family slept in the same room. But if they wanted separation, they would find satisfactory means of doing it by means of a screen.

Captain BRUNTON was glad that they were allowed to keep children away from bad parents; but many of the children had parents who were quite proper persons to have charge of them, to whom they might safely be returned. The surroundings were not always bad.

Then Mr. DIGGLE invited Dr. Kuborn to take the chair whilst Dr. Victor Desguin read his paper on "The Treatment of Orphans considered in its Physical and Moral Aspects," which was received with applause.

Then Mr. DIGGLE reminded the members that Dr. Sturges had said during the reading of his paper that he would show three children to demonstrate how St. Vitus dance began.

Dr. STURGES here showed the children, none of whom could hold up both hands steadily and alike on both sides, which, he explained, was a most important test.

FREE DINNERS FOR SCHOOL CHILDREN.

By the Rev. J. LLEWELYN DAVIES, M.A.

There is a natural bias in favour of relieving the sufferings of children. The cause of that suffering, poverty, is often due to the recklessness of parents.

The author next discussed the proposals for the remedy of this state of things, viz.: 1. State responsibility for children whose parents are willing to surrender their parental rights, or who are neglected by their parents. This scheme is not at present generally advocated. 2. Free dinners. This amounts to a grant of 6d. a-week per child to each parent. If this is reasonable, why should it be restrict- to the mid-day meal! More injury is caused by inadequate clothing than by inadequate feeding. The system is not necessarily "pauperising"; the question is, is it a public benefit? How are the children to be selected? If the worst-fed children are selected, it is inevitable that they should in the main be the children of the worst parents. If the children of the poorest parents are selected, the worst-fed children are not relieved, and the system involves domiciliary inquiries, which must be offensive and cannot be efficient. In the latter case, the system becomes one of mere charitable relief. But dinner-giving is not an effective means for relieving the deserving poor. It is important to maintain the family relations unimpaired.

This object is so paramount that neither the State nor philanthropy ought to be easily persuaded, in the pursuit of other desirable ends, to work against it. In the class of the very poor, there are special difficulties in fulfilling family duties. Sound policy would say, not "Let there be no demand of the fulfilment of family duties amongst the poor," but "Let us be especially careful to avoid acts which may tempt the poor to disown them." Thus it is evident that the maintenance of disabled parents is a burden cn working people, and good nature would suggest that instead of calling upon sons to maintain their parents, the State should undertake to do it. It was one of the abuses of our Poor Law system in former days that it gave out-relief easily to old people, and excused the sons. This is an abuse, because everyone who is competent to judge is aware that it did harm, and that great and manifest good has been done upon the whole by a greater strictness in refusing relief to those who have sons able, though with difficulty, to maintain them. Similarly, to assume that young children are to be taken off their parents' hands by the State or philanthropy, is a principle likely to do great harm. It will tempt parents to be neglectful of their children, and the class of young children will themselves on the whole be injured by it. If it were carried out, indeed, to the extreme length, so that the State should take charge, in a kindly spirit, of all children who are in danger of not being happily brought up by their parents, we might be almost fascinated by such a policy: but until we adopt that, all experience concurs with sound theory in urging that parents should be held, to the utmost possible degree, responsible for their children.

What, then, is to be done when parents spend their money in drink, and leave their children only half fed? This is a most painful question, and no answer that can be given to it will satisfy us. You will not mend things by giving food occasionally to the children, because that will be direct encouragement to the recklessness of the parents. Something may be done in extreme cases in the way of deterring the parents by punishment. But we may find most comfort, perhaps, in knowing that the number of such unnatural parents is not large, and is steadily diminishing. Where, however, parents are anxious to do their duty towards the children, but are prevented by extreme poverty from getting for them the food they require, I plead that it is a better plan to give relief trustfully and privately to a parent—better for the strengthening of the family system amongst us, more considerate towards the parent, more effectual in the long run for the children—than to distribute dinner tickets to selected children in schools.

Mrs. BESANT said that the two positions that might be taken with regard to the child in the family and in the State were: (1) That the right of the parent over the child was supreme, and that no State is justified in interfering with that right; and (2) that the child is the future citizen of the State, and as such it is to be regarded by the State of to-day, that the rights of the State for that standard are supreme, and that it may interfere between parent and child, forcing a bad parent to perform at least a minimum of duty, and where the parent does not do so, stepping in itself to supply the needs of the child. With regard to such things as may make it useful to the State, we have decided that all children shall be efficiently educated, and, on righteous grounds, we no longer permit a bad parent to ruin his child by not allowing it to go to school. It is a function of the State to defend its small members against unfair oppression, as when the father and mother keep a child in a condition of ignorance, and so make it impossible that the child can become a useful member of the State. That is to say, we do put the interest of the State above the ties of the family, in order that the child may be able to fulfil the duties which are to be put upon it. Starting from the first grant, which was given by Parliament to the children, we have come to the time when education is not a grace given to the child, but a right which the child can take. We made education free by grace some years ago, for the remission of fees is really making education free for a part of the community. It is now no longer free by grace, but by right. The question is, Is that education to be rendered useless extravagance by giving it to children whose physical condition makes them incapable of assimilating that knowledge? We give it to them for the sake of the State, and it is therefore important that it should be made as useful and efficient as possible. They could not teach a half-starved child. (Applause.) They might force it to sit and listen to the instruction, but it would be just as wise after it as before. And they were quite aware that children came to our schools in a physical condition which makes the reception of the subjects dealt with an impossibility. It is starvation which makes them so restless that they cannot keep still on the benches. If the child is to be a fit recipient for instruction, it must have its body in a fairly healthy condition; a child that is half-starving is stupid, or is blamed for that fault when the so-called stupidity is merely a physical condition of its brain which makes it unable to understand. If they took the schools in which the children had been supplied with proper food for one or two years, the same children having been left to starve before, they would find that the results of a Government examination would have undergone a remarkable change. In Sir Henry Peek's schools in one year, during which a daily dinner had been supplied to the children, every child passed the Government examination. She did not mean to say that giving food would make a child pass an examinasion, but she did say that starving it would make it unable to pass any examination at all. What is called over-pressure in our schools is generally under-feeding. Pains were taken to prevent the education being too hard to bear, but all that would be no good unless the children were in a fit physical condition to receive the instruction given by the teacher. If they were to ask the teachers what was their greatest difficulty, they would find it was the underfeeding of the children. In Mr. Davies' paper an objection which was the commonest of all was raised, namely, "Any action which takes the children off the parents' hands and makes them the immediate objects of relief is to be deprecated. It is a matter of supreme importance for our social well-being that the family relations should be maintained in health and strength, that parents should be encouraged to care properly for their children, and children in turn for their parents." And he then asks, "What then is to be done when parents spend their money in drink and leave their children only half fed?" That was a difficult question to answer, and he had not tried to answer it at all. Her reply would be that he could not maintain his position once the State had interfered and imposed burdens on the child which it could not bear at all, a half-starving child in the gutter would get dragged up somehow, more or less, but when taken away a mental strain was put upon it, a burden which it would be unable to bear. As regards the parent, all further responsibility would be taken from him. That child in the home of the very poor is a machine for making money, and out of the pennies which it begged, stole, or earned, a farthing would now and then go for its own food. If the child were taken away, the father would be deprived of his natural right to live upon part of the labour of his child. They had no right to punish the child because the parent was evil. (Applause.)

Mr. DAVIES said it was "supremely important that the family relations should be maintained;" but he could not make a parent think more of his child, and the fact that anyone helped the starving child would never make a drunkard sober, or a careful man reckless. They must not put off the parent on to the child. It was bad enough the child should have the evil habits of home upon it, without having the children made further examples of the drunkenness of the father and mother. The child by its helplessness has a call upon them, and if the father is bad, so much the more reason why they should take it in hand, and give it the care which is the right of every child which is brought into the world. (Applause.) Education is not a means of punishment to the parent, but of help to the child. He claimed for every child born into a civilised country not only education of the brain, but also of the muscles and tendons of the body, food and clothing; and that nation is false to its trust which lets the children of drunken parents grow up into evil citizens, untrained, half-starved, uncared-for, and degraded, instead of taking them out of these miserable conditions, feeding and clothing them, until they are able to do it for themselves and become well-trained, educated citizens, not by the starvation of their childhood as a means of punishing the evil ones who gave them birth, but by the humanity which took them and gave them the care they needed. (Tremendous and continued applause.)

It was proposed by Mrs. BESANT, and seconded by Lord MEATH, "That this Congress, asserting the duty of the State towards its future citizens in the matter of education, declares that the feeding or clothing of destitute children is necessary for their efficient education."

Dr. PANKHURST, in the course of his remarks, said that the idea of giving the money to the parents was a huge blunder. (Hear, hear.) If by compulsion children are brought to a given place for education, then at that place they should justly provide food, which is necessary to make that education efficient. No selection of the children of respectable parents, and no giving money to the parents. Statistics would show how much should be allowed to the school for the purpose, and then every child who wanted to could get the food. If there was a daily provision of food in every school, then parents and children alike might be left, and say whether they would or not take it.

Mr. LLOYD BAKER, Mr. BIRTWELL (general secretary of the Boston Children's Aid Society, Boston, Mass.), and Mr. HOLDEN (of Preston) having addressed the meeting,

Lord MEATH observed that this subject required very deep and careful thought on both sides. Whilst he agreed in the main with Mrs. Basant, yet he was not blind to the arguments that have been brought against her proposition, and he did think that if the children must be taught they must see that they are capable of being taught. Mr. Birtwell had said they must treat the parents as criminals in some cases; by all means do so, but do not treat the children as criminals. Now that education is free, so much money is practically put into the hands of the parents, and he thought that they (the parents) should be asked to pay for the dinners now. The parents who cannot pay should be treated as had been suggested, but for God's sake do not starve the children of England. (Applause.)

Professor **James Mavor** pointed out that in Paris some schools were worked on the plan of providing food and clothes for the children, and that the parents who cannot afford to pay can get free tickets, which, however, are exactly the same as the others, so that no one can tell who has paid and who has not. These schools had been a great success and their effect on the children very marked. (Applause.)

The **President** informed the members that an account of the institution mentioned was to be found in the book referred to by Mrs. Besant, "A Series of Prize Essays on Feeding School Children," published by the London School Board.

Dr. **Chalmers**, of Moss End, said that in his own district they had lately had a period of great depression in trade and one of a very good state of trade, and had found that neither state affected the progress of the scholars.

Mr. **Berwick** proposed as an amendment to Mrs. Besant's resolution that the words "or neglected" should be added after "destitute," and to add further the words "where such destitution or neglect is due to the misconduct of the parent or guardian of the child, it is the duty of the legislature to visit that misconduct with penal consequences."

The amendment was seconded by Miss **Gough**.

Votes for the amendment, 58; against, 18. Amendment carried by a majority of 40. For the motion as amended, 75; against, 22. Motion as amended carried.

The Frau. **Marianne Nigg**, of Kornenberg, Austria, read and illustrated by models, etc., a paper on "The Necessity for Convalescent Homes." She proposed that this Congress recognises the urgent necessity for rendering some practicable help to the ever-increasing number of useless, sick, and incurable adults, and that one of the means for accomplishing this purpose is the establishment of convalescent homes for the children of the poor, situated outside large towns, which should be supported by that district or by the State, in which not only children discharged from hospitals should be admitted, but also children of those families which are not able to provide them with the necessary means.

The resolution, not being seconded, was dropped.

SECTION V.—CHEMISTRY AND PHYSICS IN RELATION TO HYGIENE.

There was a good attendance in the Chemistry and Physics Section, when Sir Henry Roscoe took the chair. Amongst those present were: Professor Ludwig (Vienna), Professor Lehmann (Wurtzburg), Mr. Carsten (Copenhagen), Professor Guitl (Prague), Dr. Landesmann (Vienna), Mr. Landoner, Professors Odling, P. F. Frankland, Dr. Russell, Dr. Gilbert.

The **President** having referred to the importance of sewage disposal, called, in the absence of Dr. Duprè through ill-health, on

Dr. Thresh for his paper on

Chemical and Physical Processes Employed in the Treatment of Sewage.

The deleterious organic matters contained in sewage may be divided into two classes: (*a*) Those held in solution; and (*b*) those held in suspension. The latter again may be divided into (i) living organisms, and (ii) dead organic matter. The various processes which have been devised for the removal of these impurities may be classified as follows: 1. Subsidence: (*a*) With complete rest; or (*b*) by passing through large tanks with a very slow but continuous flow. 2. Filtration: Through screens or filter beds of gravel, sand, cinders, etc. 3. Percolation through materials exerting some chemical or catalytic action on the organic matter: Such as animal charcoal, metallic iron, polarite, magnetic carbide or other compounds of iron, manganese, etc. 4. Precipitation by addition of chemicals capable of combining with certain of the organic constituents with the formation of insoluble compounds: Such as the soluble salts of iron, aluminium, zinc, etc., hydrate of lime. 5. Precipitation, etc., by electrolytic treatment: As in Webster's process. 6. Destruction of the organic matter by oxidizing agents: As by the addition of permanganates and acids. 7. Sterilization: Where destruction of all micro-organisms is chiefly aimed at, as in the Amines process; or by the addition of chlorinated lime, carbolic acid, and other antiseptics and disinfectants to retard or prevent putrefactive changes. 8. Nitrification: The oxidation of the organic matter by organisms in the surface soil by intermittent percolation of the sewage through specially prepared land. 9. Utilization of the organic matter as food for growing crops: Broad irrigation. No one of these processes, unless it be the last, is capable of giving satisfactory results; but the extent to which the purification should be carried depends chiefly upon the way in which the effluent is to be disposed of. Where it can be cast with safety into the sea, or into a large tidal river, purification need not be so complete as where it must flow into a stream or river which a few miles further down furnishes the water supply to other towns or villages. In the latter case it is absolutely necessary that the sewage should be so treated as to deprive it of all specific organisms, and of the largest possible proportion of both suspended and dissolved organic matters. To effect this, a combination of two or more of the above processes must be resorted to. The combination to be adopted varies according to circumstances, depending chiefly upon the character of the sewage, the position of the town, and the mode in which the effluent is finally to be disposed of.

Sir **Henry Roscoe** remarked that the question appeared to be: Do any of the processes mentioned or any combination of them enable us to get rid of our sewage without causing a nuisance? He also referred to the experiments made by the State Board of Health for Massachusetts. Dr. Brown had obtained some very valuable information concerning the use of sand as a filtering medium, the action not being merely mechanical but chemical as well. He considered that until the question of sewage disposal had been put upon a scientific basis the problem would never be solved. He then called upon

Dr. **Alfred Carpenter** for his paper on

The Duty of a Locality to Utilise the Nitrogenous Matter in its Sewage for the Benefit of the Nation.

The object of this paper is to show that localities have duties to the nation to which they belong. The cost of utilising sewage may exceed the financial returns from the cultivated lands, and for that excess the locality utilising the sewage will have to pay, but the author contends that the increased production of crops tends to decreased price, which is a national advantage; and he expresses the belief that density of population need not involve high-priced provisions if the excreta of the population be properly used in agriculture; and that it is the duty of a nation to produce a sufficient amount of food for the people, so as to be independent of the foreigner in the event of war. He contends that the non-utilisation of sewage leads to conditions which allow of the production of disease germs and the multiplication of epidemics. He supports his arguments by the results which have been attained in Croydon, at the expense of a twopenny rate, and shows that, for this, there has been a diminished death-rate; illness correspondingly reduced; five-fold production of crops on the land, giving employment to many people in the open country, in this way withdrawing them from the crowded towns; and a great production of meat and milk; thus, to some extent, ensuring the nation against the fear of famine if war should break out, and supplies from abroad be stopped. The author strongly protests against any measure being taken to destroy the agricultural value of sewage as being opposed to national interests; and, comparing the sewage of London with that of Croydon, shows that it would be a national advantage to utilise the sewage of London as that of Croydon is utilised, and that the nation would be recouped for this expenditure if the interest on the amount expended were guaranteed by the State.

Dr. Carpenter's second paper was also read upon

The Power of Soil and Vegetation combined to Destroy Disease Germs, and so prevent the Possibility of the Spread of Enthetic Disease in consequence of Sewage Farming.

The author refers to the International Medical Congress of 1881, when he submitted a series of propositions tending to prove that sewage farming was safe. He now reproduces five of the nine propositions then submitted. 1. That the judicious application of sewage in close proximity to dwelling-houses does not depreciate the health of the inhabitants. 2. That the judicious application of sewage to land will satisfactorily cleanse the effluent water, and fit it for discharge into any ordinary rivulet or watercourse. 3. That vegetables from fields continuously irrigated by sewage are satisfactory food for man and beast, and that animals fed mainly on sewage-grown crops are as healthy as animals fed on ordinary agricultural produce. 4. The germs which spread infectious disease are not capable of reproduction on properly cultivated sewage farms, the chemical and vital conditions of the surface of the soil being contrary to their further development. 5. In order to produce the results described in proposition 4, it is requisite that the sewage be kept near the surface, moving over the land rather than through it in a downward direction. It must be kept within the influence of vegetable root fibrils and of the humus of the soil, and under-drainage is not a necessity. The author supports these propositions by a reference to the experience gained during the past 31 years on the Beddington Sewage Farm; proofs being adduced mainly from observations made during the last 10 years.

Mr. Alfred Raechling, C.E., said that in Leicester every chemical process had failed. He compared the sewage systems of London and Berlin. The latter place was drained upon the radial system. The town was divided into twelve drainage districts, each independent of one another. There were four sewage farms at work in Berlin, which were very effective. The death-rate on these farms from zymotic disease had been decreasing until in 1889 it had come down to *nil*. During an epidemic of typhoid not a single case recorded on the farms.

Dr. Gilbert asked if a large quantity of the solid matter was not got rid of before going on the farm.

Mr. Raechling replied in the negative.

Dr. Gilbert said that under certain conditions there was no question that organic matter from sewage could be removed by the soil. He could not go so far as Dr. Carpenter in condemning intermittent filtration, as there were towns where it would be impossible to treat the sewage otherwise. Neither did he consider that sufficient food might be grown for our own consumption.

Colonel Jones, V.C., C.E., agreed entirely with the remarks of the President on Dr. Thresh's paper, and stated his view on the practical question, "Will a Sewage Farm Pay?" For the London question he referred to the Canvey Island scheme.

Mr. G. H. Bremner was in favour of an aeration process of sewage treatment, and had no doubt if the London County Council put down aeration machinery no more fault would be found with London sewage.

Dr. C. R. Drysdale was grateful to Dr. Carpenter, who might be called the father of sewage farms in England. M. Durand Claye, who studied the sewage farms at Croydon, experimented with all kinds of chemicals in Paris. He was so disgusted with the results that he adopted the plan of a farm for the treatment of Paris sewage. The effluent was excellent, and the health of the district very satisfactory. Last summer he (the speaker) visited the Berlin sewage farms, and found them quite admirable. He did not think that a noble river like the Thames should be the receptacle for the sewage of London.

Mr. Perry (Camberwell) thought London should be drained by separate systems. The storm water should be dealt with separately. He agreed with Dr. Carpenter in placing the sewage on the land, but he would not care to live near a sewage farm.

Mr. A. Sillar defended the A B C process of sewage disposal, which he stated to be working admirably at Kingston.

Alderman Boulton (Burslem) rose to say that some years ago his corporation visited Croydon, and were so favourably impressed with the farm that they decided to adopt the system in Burslem.

Mr. Cripps and Dr. Page also spoke.

Sir Henry Roscoe moved: "That, in the opinion of this meeting, the best yet known method of disposing of the sewage of towns is that of purification and utilisation on the land."

Seconded by Dr. C. R. Drysdale,

Dr. C. E. Saunders supported, insisting on the absence of nuisance or danger to health in the proximity of a sewage farm, where the sewage is properly dealt with by broad irrigation.

Dr. E. Haughton also spoke.

The resolution was carried, with only a few dissentients.

SECTION VI.—ARCHITECTURE IN RELATION TO HYGIENE.

The first paper read was on

Pile Foundations in Marshy Land, and the Exclusion of Damp from Buildings.

By P. J. H. Cuypers, Amsterdam.

1. For many centuries houses have been built on piles in the marshy grounds of the provinces Holland, Zeeland, and Friesland. 2. Two centuries ago the manner of execution differed from that now followed in the smaller dimensions, and the greater number of piles kept together by strong ties under a part of wall. 3. The nature of a wooden foundation requires that every part of it be continually below the water level, else the material will not stand long. 4. In former centuries they put the brick foundations of walls, etc., immediately on the head of the piles. 5. The most general mode of construction consists nowadays in a combination of joints and boards. 6. Some civil engineers have covered the head of the piles with a great mass of concrete. Such a construction is only allowable in less swampy ground than that on which most of towns in the above-mentioned provinces are built. In ordinary house building it has not yet been used. 7. The hygienic conditions for "sousterrains" and cellars built on a wooden foundation are the following: (*a*) The foundation of walls must be laid underneath the water level; (*b*) the floor or pavement must be above the highest water level; (*c*) in case the floor is situated lower than the surrounding water level, pavement and wall must be constructed

waterproof; (*d*) a quite different method of constructing cellars is used when they are made independent of the surrounding walls, and built by masonry in a floating basin.

No discussion took place on this paper.

Mr. H. H. Statham, F.R.I.B.A., read a paper on

Some Insanitary Superstitions in House Building.

The remarks in this paper refer more especially to houses built in large and crowded cities. Houses built in open situations in the country are permeated by an atmosphere comparatively pure and clean. Houses in large towns are permeated by an atmosphere laden with impurities, which are continually being deposited on every surface that will retain or absorb them. They are also subject, unless carefully watched, to the incursion of various types of vermin. It is, therefore, desirable that houses should be constructed of materials the least likely to absorb and retain impurities, and that the method of construction should be such as to leave no unlighted and inaccessible spaces.

The habitual construction of ordinary houses in England is not in accordance with these requirements. For many generations the orthodox manner of making a house-floor has been to lay wooden joists from wall to wall with boards nailed down above, and a lath and plaster ceiling beneath, the space between being an unseen cavern for the accumulation of whatever dirt and decaying matter can find its way in. What the results may be I once saw in the worst form in a case where the boards of an East End school-room were taken up to ascertain the condition of the joists. The space between those joists was filled nearly to the top with dirt and dust, over which the children had been daily collected. Such a floor would not be allowed in a modern London board school, but it is the accepted floor for a dwelling-house; and though the conditions of a well-kept dwelling-house do not encourage such an accumulation as this, I believe the tenants of the best kept London house which has been inhabited for any length of time would be disagreeably surprised at the amount of dirt they would find under their flooring boards if they looked for it. The old-fashioned system of ceiling up to the under side of the flooring boards and leaving the joists visible is far more sanitary; the drawback is that it is unsightly, and that it does not shut out sound sufficiently. Double flooring boards with felt between would get over the latter objection to some extent; but what I wish to recommend is the general adoption of solid floors of iron and concrete, with a wood block or plain parquet floor on them, for the average town dwelling house. They are almost necessarily adopted for houses in flats; why not for every dwelling house?

It has for many generations been the recognised faith that a house roof can only be made by means of rafters laid on the slope with a tie at the foot, and with ceiling joists either at the springing of the roof or part way up the slope. The advantage of this is that the upper rooms which go partly into the roof are rendered inconvenient and unsightly by a low sloping ceiling to half the room, and that above the ceiling joists is a dark cavern between them and the roof, into which no one ever sees, and where dirt may accumulate and vermin may breed undisturbed. It is really an almost alarming thought to reflect what is the probable cubic content of these dark caverns in the roofs of houses over all London. If it be thought necessary to go on building sloping roofs, either the whole slope of the roof should be thrown into the top rooms, as the visible ceiling, or the ceiling of the highest living rooms should be at the level of the roof springing, and the space between that and the rafters should be treated as storage space easy accessible and sufficiently lighted to be readily examined from time to time. But in fact it is entirely unnecessary, in these days of iron, and concrete, and tile, that we should build sloping roofs at all; the doing so is a mere superstition, except where reasons of architectural effect are concerned, and certainly architectural effect does not concern itself much in the ordinary house roof. With flat roofs with a cement finish and sufficient fall to run the rain to the gutters, we should get rid at once of all these dark caverns, the exterior and interior of the roof would coincide in shape, and convenience and healthfulness would be alike consulted.

The whole tribe of things called "skirtings" and "casings" are superstitions of the same kind for providing dark, inaccessible places where no cleansing hand can ever come. Baths and water closet basins are surrounded with those foolish fences of joinery; whited sepulchres, which, indeed, appear neat outwardly, but within they are full of—no one knows what, for no one ever looks. Let both water-closet and bath stand open to inspection all round, instead of being cased in. In the matter of the bath, the money spent on panelled casing and "polished baywood or mahogany top" would go far to render the bath itself a neat and presentable piece of furniture.

Casings for pipes are, no doubt, necessary, and are generally specified to be screwed on, so as to be removable when required. They never are removed, or the space behind seen, except when something is wrong with a pipe. They should be hinged, and made with button fasteners, so that they can be opened every day without any trouble. Among other drawbacks, they form a private lift or elevator for the cockroach, who is fond of warmth, and is enticed to ascend along the line of the hot-water pipes. The cockroach is bad enough in the kitchen, but a good deal worse in the bed-room; it is hardly worth while to afford him the luxury of a private passage, heated with hot water, to the upper floors.

The passion for sash windows in this country leads to the employment of another system of wooden cradling built up round the windows, with hollow inaccessible boxes for the lines and weights, besides (generally speaking) another set of hollow spaces behind the back of the shutter casings. It is perfectly possible to make sash windows without pulleys and weights in more ways than one, unless when they are very large and heavy. But the casement window has the advantage that it can be hung in solid frames without any of this bandbox work round it, and making it weather-tight is merely a matter of care and scientific construction. It is worth consideration whether we should not do better to return to it as the more wholesome and sensible structure of the two.

Wall paper is a simple and inexpensive means of producing decorative effect in a room, but papers should be close in texture and smooth in surface. Papers with embossed surfaces, and, above all, what are called "flock" papers, are dust holders, and such wall surfaces cannot be kept properly clean. Coloured plaster, finished with a hard surface, is more sanitary than any paper, considering that the paper has a layer of paste behind it which becomes rotten in time. If, however, papers are renewed often enough, and the plaster stripped and well scoured at each renewal, the insanitary element in them is not of sufficient importance to counterbalance the decorative gain.

Large and deep plaster mouldings and decorations are now, fortunately, going out of fashion on æsthetic grounds; they are injurious to the cleanly condition of a house, affording so many pockets for the lodgment of dirt. As long as they are kept flat and in low relief there is no harm in them. The wooden mouldings with a hollow on the top, which are now much used to take picture-hooks, are objectionable, as the hollow is always full of dust. The old brass picture-rods are much to be preferred in this respect.

Furniture, which is a kind of minor architecture, has its superstitions of construction, the worst of which is the system of finishing large wardrobes, book-cases, etc., with a cornice standing up all round the top, leaving a wide pit for dust, which is never seen, and cannot be swept. This cornice is a mere fashion, utterly useless and absurd. The top should be made level or (still better) sloping, and with no raised ledge above it, so that it can be swept. It is best of all to make large erections of this kind as fixtures, carried up to the ceiling, and finished with a moulding against the ceiling; then there is no place where dust can accumulate.

The last superstition I will mention concerns that important receptacle, the cistern. The cistern should be in a well-lighted place, where it can be easily seen every day. The best way would be to make it as an aquarium tank is made, with a front of plate glass, so that you can see the light through the water.

Mr. Collins said that there were many practical points in the admirable paper read by Mr. H. H. Statham, which the architects of this country have had before them not for the first time. There were many other ways of constructing floors without the use of iron and concrete, he might mention terra cotta as one of these. One point worthy of consideration is that the wood floor is the least inflammable of all kinds of floors, and consequently one of the safest. There had been floors made of solid wood blocks, which were not very expensive. The reason why floors are construeted in the present unhygienic manner is the extra expense involved in making solid floors. With regard to building flat roofs to houses he thought that they would hold a great quantity of water compared to the present sloping roofs, which would cause dampness. With regard to the windows recommended in Mr. Statham's paper, they were very inconvenient, and occupied a considerable space.

M. Ch. Lucas, of Paris, insisted on the many inconveniences alluded to by Mr. Statham, and which also exist in France. Thanks to the damp-proof courses, either in iron, brick, or concrete, at all events, in great towns, the consequences of dampness of the soil. On the other hand, we still have in houses too many obscure and non-aërated corridors, too many alcoves, too many staircases ventilated only at the lower part. One has also to struggle against hangings, curtains, etc., which the upholsterer places about our windows to prevent the penetration of both air and light. Our sanitary fittings, *e g.*, lavatories, baths, closets, require suitable situations and proper surveillance.

Colonel Prendergast spoke with reference to the advisability of having solid floors, and said he thought that the point was whether such floors prevented the efficient ventilation of the rooms. If a ventilating flue be put in a room, that flue must be supplied with air; but if no air could penetrate the floor, he did not see how the room could be properly ventilated; and, referring to solid floors, he stated that he could not see why they should not be constructed of paper.

Mr. Neville said that it was a matter of great difficulty to get owners of houses to go to the expense of having solid floors to their dwellings, and, unless they could be induced to believe that they were absolutely necessary from a hygienic point of view. The speaker had had experience of the filth and vermin which accumulated in the spaces under the old buildings, and these matters had attracted his attention when old buildings were pulled down. Members of the medical profession had more influence than architects with reference to sanitary arrangements. The great difficulty with regard to solid floors is to fasten the boarding on the top. It would be an easy matter to place the concrete on the surface, but people object to this. Mr. Neville recommended that floors should be kept in a sanitary state by the use of turpentine and beeswax. The objection to flat roofs was the amount of guttering which would be required to carry off the surface water. Picture rails were now made without any recess behind, and this obviated the objection to them which was urged by Mr. Statham.

Mr. J. P. Seddon advocated the utilisation of fireplaces as a means of ventilating buildings. He remarked that some persons thought it necessary to have the walls hollow to keep the place dry, but he contended that the best methed, was to build the walls in two parts, and to fill the hollow with cement.

Colonel Seddon mentioned instances where iron cables and iron rods had been introduced into concrete foundations, and had been the means of greatly increasing their strength and solidity.

Mr. Hanham entirely agreed with Mr. Statham's remarks on solid floors, but thought that the great practical difficulty to their general adoption was their expense. With regard to the form of roof, the cavity formed by a sloping roof afforded a convenient space where gas pipes could be conveniently concealed from sight. The people in his town (Leeds) objected to have pipes exposed to view in their rooms.

Discussion on Professor Emile Thelat's Paper.

Professor Chevalier F. von Gruber did not desire to speak in opposition to the talented exposition of the reader, but wished to observe that a large part of wall spaces is occupied by windows, which in England, as well as in France, are not only constructed single, but are also of large size, without any regard to reason. The transmission of heat through glass is greater than through wall-work, and so long as only single windows are in vogue, it is useless to increase the thickness of walls. But with the doubling of windows, and the recognition of the effects of climate, the consideration of the defective non-conduction of walls, we must remember that the requirements of hygiene must not be pushed to extremes when applied to the greatest need of the moment, the provision of dwellings for the poorer classes. The permeability of walls cannot be separated from the question of ventilation. When the proper warming and change of air are adequately provided for, then it is best that the walls should be impermeable. But when exchange of air is inadequately provided for, the appliances for this purpose insufficiently used, then we may certainly lay down this established fact, that the increased permeability of inner and outer walls is the right thing.

Dr. Spottiswoode Cameron remarked that if we could make our walls impervious to air, should we not be doing as much harm as good, for the oxiginating process which takes place in the walls, would be prevented; in many houses the ventilation takes place almost entirely through the walls.

Mr. Neville did not agree with Mr. Seddon in his remarks that solid walls were preferable to hollow walls. He also remarked that it was no good increasing the thickness of walls when there is only a pane of glass between the inmates of a room and the open air, as everybody is aware of the immense amount of cold which finds its way through a sheet of glass, and he suggested that two sheets of glass having an air space between should be used in the construction of houses.

Mr. Collins instanced a case where a number of houses were built of iron slag, which proved to be quite uninhabitable, and water actually ran down the walls of the rooms.

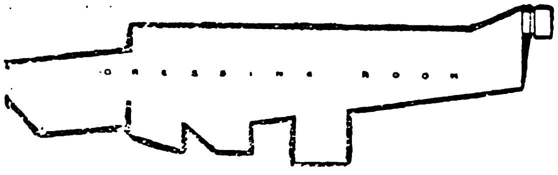
Mr. Buchan said that in the case mentioned by Mr. Collins, the water which ran down the walls was caused by the want of ventilation. He knew of an instance where large double windows had been constructed, and the persons in the building suffered greatly from cold. He thought that it would be interesting if a series of experiments were made with reference to the amount of air-space between the sheet of glass which was necessary to prevent the escape of heat from a room.

THE SANITATION OF THEATRES.

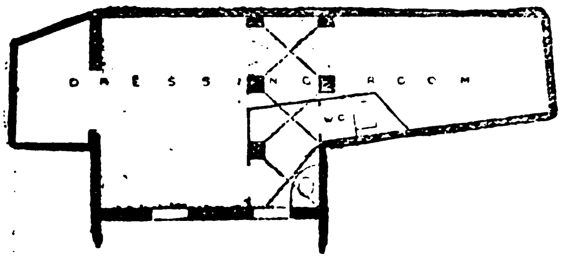
Dr. **LENNOX BROWN** and Mr. **ERNEST TURNER** read papers on "The Sanitation of Theatres." Mr. Turner's paper was copiously illustrated with diagrams, some of which we give below.

The buildings represented are of very different dates, and the strong contrast which is presented between those of earlier and those of later date marks well the progress of sanitation, and lead to the conclusion that many of the older theatres require their sanitary arrangements remodelled, amounting, in some instances, to an entire reconstruction of a portion of the buildings.

Nos. 1 and 2 represent two of the worst dressing-rooms seen. No. 1 is occupied by 16 to 18 girls, who have to remain the greater portion of the evening in this room, which is under the stage, and practically unventilated. Having regard to the small amount of cubic space, the number of lights and occupants, and the impossibility of air renewal, such an arrangement must be condemned as highly insanitary. Indeed, it is nothing short of gross cruelty to compel human beings to occupy such a den. No. 1 is another cellar dressing-room, in the same theatre, with piers and vaulted roof, almost, if not quite, as bad as the last, and has, in addition, a closet and sink in objectionable proximity. The legal definition of a "cellar dwelling" is "an underground room in which any person passes the night," and it is illegal to occupy such room unless certain regulations as to height from floor to ceiling, size and position of window, means of ventilation, etc., are complied with. These cellar dressing-rooms do not in any way comply with such regulations; but it appears that they may be occupied from 6 o'clock until 12, although occupation from 12 to 6 would be illegal. Turning for a moment from examples of bad arrangement, it is a pleasure to be able to say that there are metropolitan theatres where, in the dressing-rooms used in common by a large number of supers and dancers, there is not only ample cubic space in the rooms, but excellent natural and artificial ventilation.



THE SANITATION OF THEATRES. No. 1.

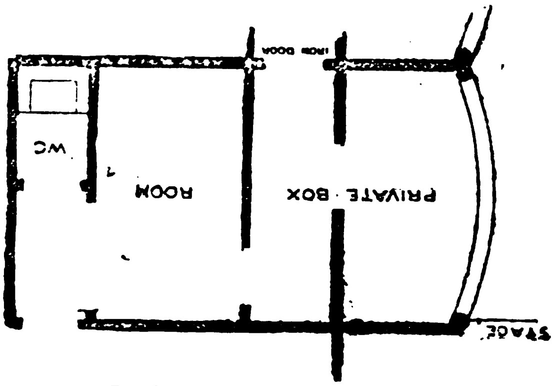


THE SANITATION OF THEATRES. No. 2.

No. 3 illustrates an unventilated closet in relation to a private box, showing what luxury is provided for those who can afford to pay for it; and No. 4, the arrangement of a ladies' cloak-room, this last being typical rather than unique. In the brief notes the author confined his remarks almost entirely to the plan of the apartments mentioned, the plan of the building being, from an architect's point of view, of primary importance, for, if this be imperfect, no subsequent so-called "sanitary engineering," however skilful, can make amends for the original defect.

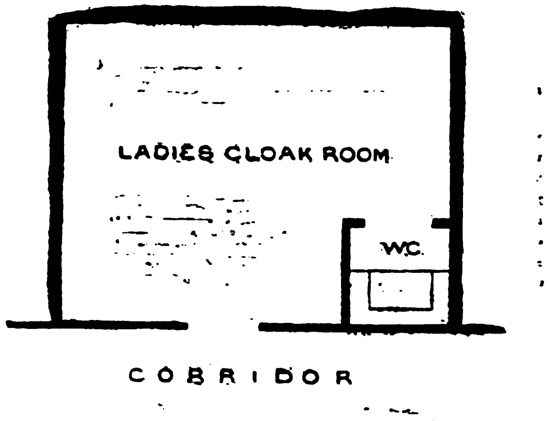
DISCUSSION.

Dr. **FRANCIS ALLEN** gave instances where in certain theatres the w.c. was situated in the lavatory, and where a cupboard for keeping provisions was adjoining a w.c. and urinal, and remarked that such insanitary arrangements could not always be said to be the architect's fault, as in many cases the space which he had at command was very limited. He was of opinion that there was good work to be done, not only among theatres, but among concert rooms and private clubs in respect to sanitary arrangements. He was sure that in many of these the ventilation arrangements were of the worst description.



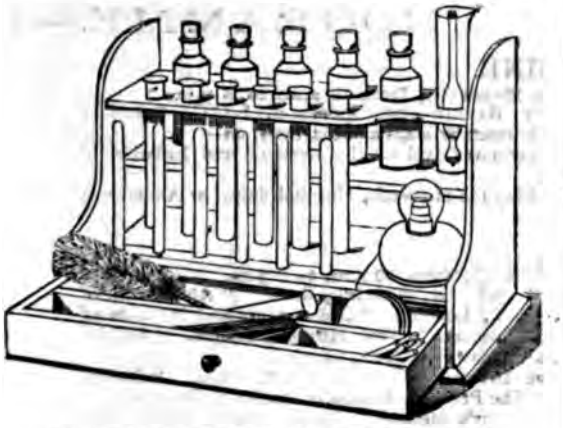
THE SANITATION OF THEATRES. No. 3.

Mr. W. **EMDEN** said that in England places of amusement are not recognized as a necessity, and that, in consequence, all these places were the result of private enterprise. He considered that if the buildings were properly planned, there would be no need of isolation from the adjoining property. He contended that the only proper means of ventilation was from the top of the building, and that there was no reason why theatres should not be built partly underground—that is, with the lower tier on a level with the ground outside.



THE SANITATION OF THEATRES. No. 4.

M. F. **BONHON**, Membre de la Commission des Logements-Insalubres de Paris, considered that diagram No. 4 was the most typical of insanitary conditions, absolutely without light or air, and ought to be immediately dealt with. He was especially astonished, on visiting London,



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Meet in the rooms of the Society of Antiquaries, Burlington House (B), from 10 a.m. to 2 p.m.

Deputy-Surgeon-General BOSTOCK, C.B., and Sir VINCENT KENNETT BARRINGTON, Alderman, L.C.C., Delegates from the Metropolitan Asylums Board, will communicate Papers, illustrated by maps and diagrams, on—

"The Hospital and Ambulance Organisation of the Metropolitan Asylums Board for the Removal and Isolation of Infectious Disease," with statistics.

⁂ Facilities will be afforded to Members of the Congress desirous of visiting the Hospitals, Hospital-Ships, or Ambulance Stations of the Board.

ection II. BACTERIOLOGY.

Meet in the rooms of the Royal Society, Burlington House (C), from 10 a.m. to 2 p.m.

1. DISINFECTION AND DISINFECTANTS.—"Disinfection in the Living Body." Dr. BEHRING, Berlin. "An Account of Experiments bearing on Antiseptic Surgery." Professor CROOKSHANK, London. "Disinfectants and Methods of Examining Them." Prof. MAX GRUBER, Vienna. "Kresole as a Disinfectant." Prof. HUEPPE, Prague. "Experiments on the Action of Antiseptics in the Healing of Wounds." Dr. ARMAND RUFFER, London.
2. PREVENTIVE INOCULATION.—"The Practical Value of Preventive Inoculation." Dr. ROUX, Paris. "Studies relating to Inoculation against Rabies." Prof. BABES, Bucharest. "The Practical Results of Antirabic Inoculation." Prof. HÖGYES, Budapest. "The Treatment of Hydrophobia by Pasteur's Method." Dr. BARDACH, Odessa; Dr. BORDONI-EFFREDUZZI, Turin; Dr. KRAIOUCHKINE, St. Petersburg; Dr. CELLI, Rome.
3. THE BACTERIOLOGY OF AIR, SOIL, AND WATER.—"On the Etiology of Typhoid Fever—the Relation of Eberth's Bacillus to B Coli Communis. Professor ARLOING, Lyons. "Typhoid Fever in connection with Drinking Water." Prof. FODOR, Budapest. "The Hygienic Value of the Bacteriological Examination of Water." Prof. PERCY F. FRANKLAND, F.R.S., Dundee. "The Importance of the Bacteriological Examination of Drinking Water." Dr. MCWEENEY, Dublin. "A Bacteriological Study of the Berkefeld Water Filter." Dr. PROCHMIK, Vienna. "The Detection of Typhoid Bacilli in Water and Soil." Prof. SCHOTTELIUS, Freiburg. "Certain Toxicogenic Organisms found in Drinking Water." Dr. VAUGHAN, Michigan.
4. FERMENTATION.—"Some Fermentations excited by Specific Micro-organisms." Prof. PERCY F. FRANKLAND, F.R.S., Dundee. "The Relation of certain Organisms to Fermentation of Urine." Demonstration by Mr. S. G. SHATTOCK, London.
5. THE BACTERIOLOGY OF VACCINE LYMPH.—Dr. COPEMAN, London; Prof. CROOKSHANK, London. Demonstrations.

ection III. The RELATION of the DISEASES of ANIMALS to those of MAN.

Meet in the rooms of the Geological Society, Burlington House (D), from 10 a.m. to 2 p.m.

1. The Infectious Diseases of Animals Communicable from Animals to Man, or vice versâ.—Papers by Prof. D. PERRONCITO, Turin; Prof. EDGAR CROOKSHANK, M.B., London.
2. Anthrax and its Relation to Workers in various Trades.—Papers by Prof. CHAUVEAU, Paris; W. DUGUID, F.R.C.V.S., London.
3. Veterinary Hygiene.—Paper by FRED SMITH, M.R.C.V.S., F.I.C., Aldershot.

⁂ All communications relative to this Section should be addressed to ERNEST CLARKE, F.S.A., 12, Hanover Square, ndon, W.

ction IV. INFANCY, CHILDHOOD AND SCHOOL LIFE.

Meet in the Theatre of the University of London, Burlington Gardens (E), from 10 a.m. to 2 p.m.

The following Papers, relating to Division III. of the Sectional Programme (Child imperfectly constituted), will be read and discussed.

1. DR. SHUTTLEWORTH, of Lancaster: "The care of the Mentally Feeble, as distinguished from the Imbecile Child." DR. FLETCHER BEACH, of Dartford: "The Method of dealing with Epileptic, Feeble Minded, and Imbecile Children." DR. LUDWIG STRÜMPELL, of Leipzig; DR. F. L. A. KOCH, of Leipzig; DR. EMIL SCHMIDT, of Leipzig; DR. ERNST HASSE, of Leipzig: "A contribution to the study of Mentally Feeble Children, with a suggested scheme for Collective Investigation." DR. J. LANGDON DOWN GUYE AND E. VON HOFMANN has expressed his intention of taking part in the discussion of these Papers.
2. DR. CAMPBELL, Principal of the Royal College for the Blind, Norwood: "The Education of the Blind." GENERAL MOBERLY, of London, Chairman of the Sub-Committee on the Education of the Blind, Deaf and Dumb: "The Physical, Manual, and Technical Education of Deaf-Mutes." DR. GUTZMANN, of Berlin: "The Hygiene of Speech in Children."
3. DR. KOTELMANN, of Hamburg: "On the Acuteness of Vision of School Children."
4. DR. ADOLF BRONNER, of Bradford: "On the importance of detecting and treating Defects of Vision and Hearing in the Children of our Board Schools."

ction V. CHEMISTRY AND PHYSICS IN RELATION TO HYGIENE.

Meet in the rooms of the Chemical Society, Burlington House (F), from 10 a.m. to 2 p.m.

Meteorological and Miscellaneous Subjects.

Dr. ALEXANDER BUCHAN, M.A., will give an Introductory Address on "The General Relations of Meteorology and Hygiene."

Paper on "The Influenza and Weather of London," by Dr. A. BUCHAN and Sir A. MITCHELL.

Dr. MORTIMER GRANVILLE will take part in the discussion with regard to "The Temperature of the Body in Influenza in Relation to the External Temperature."

Paper on "Hygienic Improvements in the Manufacture of Bread," by Mr. JOHN GOODFELLOW

Paper on "Bromine and Iodine as Aërial Disinfectants; and on a New Method of Applying them," by Dr. G. T. MOODY and Mr. F. W. STREATFIELD.

ction VI. ARCHITECTURE IN RELATION TO HYGIENE.

Meet in the West Examination Hall in the University of London, Burlington Gardens (G), from 10 a.m. to 2 p.m.

English Isolation Hospitals: R. THORNE THORNE, M.D., Inspector, Local Government Board.

The Heathcote Hospital, Leamington: KEITH D. YOUNG, F.R.I.B.A.

Temporary Local Isolation Hospitals as opposed to a Central Hospital: C. E. FEW, Vicar of Seal, Sevenoaks.

sylum arrangement and construction: RICHARD GREENE, M.D., and G. T. HINE, F.R.I.B.A.

Hygiene and Demography.

, AUGUST 14th.

Section VII. ENGINEERING IN RELATION TO HYGIENE.

Meet in the East Examination Hall in the University of London, Burlington Gardens (H), from 10 a.m. to 1 p.m., and 1.30 p.m. to 4 p.m.

The following special papers will be read and discussed :—

H. P. BOULNOIS. The work of the Municipal Engineer. Dr. L. de CSATARY. Railway Hygiene.

In the afternoon Members may visit the Sewage Outfall Works at Barking and Crossness, leaving Westminster Pier a 1 p.m. and lunching on board the "Drummond Castle."

Section VIII. NAVAL AND MILITARY HYGIENE.

Meet in the rooms of the Linnæan Society. Burlington House (I), from 10 a.m. to 2 p.m.

The Papers to be Read and Discussed will be as follows :—

1. Prophylaxia de la Tuberculose Pulmonaise (Mortalité far Phisie dans l'Armé Belge), by Dr. V. LOGIE, Medicin de Regiment au 3d Lancers, Bruges.
2. Tentes et Baraques, by Dr. DUCHAUSSOY, of Paris.
3. The Duties of the Medical Staff on Active Service, by Brigade Surgeon C. H. Y. GODWIN, M.S., of the Army Medical School, Netley.
4. Ambulance Organisation and Medical Arrangements of An English Army Corps in the Field, by Surgeon C. I. ADDISON, Medical School, Netley.
5. Etude Statistique sur la Suicide dans l'Armees European by Dr. R. LOUGUET, of the French Army.
6. Practical Hygiene in War Time, by Dr. GROSSHEIM.
7. Treatment of Fractures and Wounds in the Field, by Dr. FELIX, Brussels.
8. A Case of Lightning Stroke, by Dr. SCHEIBE.

Section IX. STATE HYGIENE.

Meet in the rooms of the Astronomical Society, Burlington House (K), from 10 a.m. to 2 p.m.

I. Rappart sur l'Organisation Sanitair de l'Espagne : By Professor J. VILANOVA y PIERA, of Madrid.

II. Administrative action in regard to Outbreaks of Infectious Disease :—

1. Dans quelle mésure le Gouvernment peut il intervenir pour entraver la propagation de la Phthisie on Tuberculose pulmonaire : Paper by Professor A. CORRADI, of Pavia.
2. On the Notification of Infectious Diseases : Papers by P. BOOBBYER, M.B., Medical Officer of Health for Nottingham, and D. BIDDLE, M.R C.S.
3. On Temporary Shelters for Isolation Purposes : Paper by J. SPOTTISWOODE CAMERON, M.D., Medical Officer of Health for Leeds.

III. On Venereal Diseases, and the duty of the State in regard to them :—

1. Paper by Mr. J. HOLROYDE.
2. Paper by Dr. J. BIRKBECK NEVINS.

. Nee **Friday Afternoon at 2.15 p.m.**

IV 1. Pd for popular instruction in Hygiene and Physiology in regard to Health :—
apers by—ARTHUR NEWSHOLME, M.D., M.O.H., for Brighton : "The Teaching of the Laws of Health in Schools." [Hygiene."
2. Miss MARGARET ELEANOR SCOTT, of the National Health Society : "Women's Work in promoting the cause of
3. GEORGE CUNNINGHAM, M.A., Lecturer on Dental Surgery at the University of Cambridge : "Popular Instruction in Preventive Dentistry." Lantern.
4. WM. BRUCE, M.D., M.O.H. for Ross and Cromarthy.
5. Surgeon-General FRANCIS, Delegate for the National Indian Association : "The work of the the Association in India, especially in regard to Sanitary matters."

DIVISION II. DEMOGRAPHY.

Meet in the Theatre of the Royal School of Mines, in Jermyn Street (L), from 10 a.m. to 2 p.m.

1. Resultas Statistiques de l'Anthropométive appliquée à l'indentification des personnes.—Dr. JAQUES BERTILLON, and Dr. ALPHONSE BERTILLON.
2. "Personal Indentification by Scar Marks, &c." By Col. CHARLES R. GREENLEAF, and Major SMART, (United States Army), showing methods of record in United States Army, and comparing them with M. Bertillon's method.
3. "Exhibition of Finger Prints and of Registers of them as a means of Personal Identification." FRANCIS GALTON, F.R.S. Discussion on these three Papers.
4. "Results of Anthropometry at Cambridge." Dr. JOHN VENN, F.R.S.
5. "The Physical Condition of Children seen in Schools, and the local distribution of conditions of Defective Development." FRANCIS WARNER, M.D., F.R.C.P.
6. "Examination into the Condition of the Teeth of School Children." J. S. TURNER and N. B. PATERSON, Delegates of the British Dental Association. Discussion on these four Papers.
7. "The Physical condition of Pauper Children Boarded out under Local Government Orders, 1870 and 1889."—Miss FANNY FOWKE.

The term of Proposed Resolutions in respect to subjects already considered, will then be read, and votes will be taken on each without further discussion.

1. Whether it should be formerly entered on the Minutes.
2. Whether it should be adopted by the Demographic Congress.

SOCIAL ARRANGEMENTS.

For Invited Guests.—Visit to the Royal Naval Exhibition on presentation tickets to foreign members. Inspection of the Hospital Ships under the Metropolitan Asylums Board, at 2 p.m. The Ambulance Steamer will leave Westminster Pier 2 p.m. Light Refreshments will be provided on board the Hospital Ships. Visit to the Beckton Gasworks, and to the sewage outfalls at Barking, with lunch on board Sir Donald Currie's steamer "Drummond Castle." The steamer will leave Westminster Pier 12.45 p.m. A train will leave Canning Town Station 3 p.m. for Barking, to visit Beckton Gasworks and the sewage outfall. Limited to 190. Garden party at Sir Spencer Wells's, 4 p.m. to 7.m. Breaks will start from Burlington House at 3 p.m. for Golder's Hill, Hampstead, returning 7 p.m. : tickets for the breaks, 2/6 each. Conversazione at South Kensington Museum. (Ladies and Gentlemen.) 9 p.m. 12 midnight. Evening Dress.

For Members, on production of Congress Ticket.—Parkes Museum, 74a, Margaret Street. Zoological Gardens, Regent's Park. Royal Botanic Society's Gardens, Regent's Park. British Museum, 8 to 10 p.m.

VINACOCA

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the cradle of sanitation, to see so many cellar dwellings. Even in the newest model dwellings he saw kitchens below the surface of the ground occupied.

Mr. **Edward Dunville** (Exeter) advocated the building of theatres similar to those of ancient Greece, without the overhanging gallery, and with tiers arranged one behind the other, starting from about the centre of the building. He gave a description of the theatre at Exeter which was constructed on this principle.

Dr. **Dolan** (Halifax) said that unless the force of public opinion was brought to bear upon proprietors and managers of theatres and places of amusement the present miserable state of things was likely to continue. He affirmed that he had traced many cases of infectious malady to the insanitary condition of theatres, but he was pleased to state that in Halifax a great improvement had of late years taken place in the condition of theatres.

SECTION VII.—ENGINEERING IN RELATION TO HYGIENE.

The President took the chair at 10 a.m., and the first paper was read by **Percy F. Frankland**, Ph.D., B.Sc. (London), F.R.S., etc., on

The Present State of our Knowledge Concerning the Self-Purification of Rivers.

The author referred to the more important experiments which have been made on the subject in this country, viz., those of the Rivers Pollution Commission on the rivers Irwell, Mersey, Darwen, and Thames, and those of the author on the Thames from Oxford to Hampton, and on the Ouse between Richmond and York. These experiments all negative the theory of self-purification as regards dissolved organic matter, although unmistakable improvement is traceable in the case of suspended matter. Of the work of foreign authors, having a similar object, the more noteworthy are those of Hulwa on the Oder near Breslau, of Frank on the Spree at Berlin, and of Prausnitz on the Isarat, Munich. The author reviewed the work of these several investigators, who in some respects are out of harmony with each other, Hulwa supporting self-purification, even as regards dissolved organic matter, Frank limiting it to suspended matter, and Prausnitz adopting an intermediate course. The author referred to his own experiments on the removal of microbes from water by agitation with solid particles, and pointed out how his results serve to explain the diminution in the number of microbes in river water through sedimentation as observed by Prausnitz and Frank. The self-purification of rivers has frequently been supposed to justify the use of river water, which has received sewage contamination, for town supply, but the author contends that the evidence of purification is wholly inadequate to justify such a course. Unanimity only exists with regard to self-purification by sedimentation, a process which can never guarantee the absence of danger, whilst of the removal of dissolved organic matter to any large extent there is no evidence at all. Of far more importance in securing the greater safety of water supplies from rivers and surface sources generally is their efficient filtration through sand.

The Refrigeration of Water in Cooling Pits,

By Professor **Arth. Oelwein**, Vienna.

One is often placed in the position of having to arrange water supplies for towns and districts where there are no springs of sufficient volume, nor any valley-beds without outlet containing a corresponding depth of water, in which collected surface waters might cool, and where the alternatives are either to make new ponds with a depth of three to four metres, or to use those of this size which may already exist. From Professor Simony's measurements of the temperature of water the peculiar fact was made evident that, in mountain lakes with but a slight supply and discharge, and hence with but little movement, the temperature of the water in midsummer rapidly falls from 20° C. at the surface to from 5° to 4° C. at the depth of 20 m., whereas in lakes with a rapid supply and discharge, and where, therefore, the waters are in constant motion, the fall of temperature is very gradual, and the same fall of 15° to 16° C. is not to be found above a depth of 50 to 60 m. Acting on this fact, Professor Oelwein, when planning a water supply for the town of Iglau (pop. 23,000), where the existing ponds of a depth of 2 to 4 m. had to be used, the waters of which often rose in summer to a temperature of 23° C., cooled the waters of these ponds before discharging them into the filters, by causing a pit, 17·3 m. deep, and containing about 9,000 cb. m., to be dug in the lowest pond; from the depths of this pit the water was then forced up through the overlying column of water. The results of this system during three years' working were unvarying; and in the summer months a cooling of 9° to 10° C. took place, so that when the temperature of the pond waters was at its highest, namely, 23° C., the water drawn from the cooling pit had only a maximum temperature of 15° C. Had this pit been dug to a depth of 20 m. the cooling of the water at the bottom of the pit would have been greater by 2° to 3° C., and the maximum temperature in summer would then have fallen to 12° or 13° C.

Professor **Robinson** stated that he was in concord with what Dr. Frankland had said.

Mr. **Baldwin Latham** expressed an opinion that Dr. Frankland was hardly justified by his experiments to come to the conclusions at which he had arrived.

The discussion was continued by Dr. **Church** and Mons. **Rummel**.

Mr. A. **Mault** agreed with Mr. B. Latham that Dr. Frankland was hardly justified in the conclusion he had drawn from his experiments. He was of an opinion that the sources of pollution increased in a greater degree than the sources of dilution.

Dr. S. **Smith** pointed out that there must be a gradual purification taking place in rivers, or the results of analyses lower down the river would have given a far greater degree of pollution than was shown by the experiments.

Mr. **Anderson** quoted an instance where there is a slaughter-house on the banks of the river, and that all the blood, etc., is discharged into the river, and that it disappears a very short distance from the source of pollution. He attributes the purification chiefly to plants and animals.

Mr. **Moss** asked if boiling water entirely destroys all pathogenic microbes?

M. **Margon** said that if water was kept at 130° C. for ten minutes it was perfectly sterile, but that it was not sterile if kept at that temperature for five minutes.

Dr. **Frankland** then replied to the criticisms on his paper.

The **President** (Sir J. Coode) said that although he was averse to drawing comparisons, he could not help remarking that probably no subject will be discussed at this Congress which is of greater importance than that dealt with in Dr. Frankland's paper, and which has been so ably dealt with by the various speakers this morning.

A paper was read on

Refuse Destructors

By **Charles Jones**, A.M.I.C.E., F.S.I.

The dealing with house refuse is a fruitful cause of much contention. The old methods of disposing of the contents of the dust-bins were most difficult, and the rapid growth of our busy towns has made the dust and refuse question a burning one. Difficulties, expense, and danger of removing refuse to the nearest shoot or barging it away to outside districts. Early attempts to cope with the difficulty: nearly forty years since furnaces were constructed for the purpose of destroying refuse, and these only in crude forms. This led to the introduction by Mr. Fryer (of Manlove, Alliott, and Co.), of "the Destructor," and further inventions followed; Pickford, with the "Gourmand," one part of which was of the highest importance, viz., that which dealt with the fumes by second fires. Then followed others by Healy (at Bradford), Thwaites, Young, of Glasgow, Wilkinson, of Birmingham, Burton of Stafford, and Pearson of Burnley with the "Beehive," and Nelson, and several others. No reliable information can be given as to the cost of erection, it being so much affected by site, height of shaft, level of ground, etc. The cost of burning per ton of refuse also varies considerably. In some towns the residuum is a marketable commodity, etc. At first there was a difficulty in dealing with the gases given off by the material in the first stage of burning, and the dust which escaped from the shaft, which was the cause of serious complaints, and prevented the introduction of the "Destructor." After earnest investigation, and careful consideration, "Jones Fume Cremator" was the result, and these complaints are now things of the past. The "Destructor," if properly worked, may be used anywhere without the slightest fear of any complaint arising. The gases are subjected to a temperature of from 1,100° to 1,500° F., at little expense of fuel. The heat thus generated is used in a variety of different ways in connection with tubular boilers for pumping, for pneumatic ejectors, for driving dynamos, and working of various machinery for sanitary works, etc., thus effecting a considerable saving, and, after repaying principal and interest, leaving a balance, a result which is infinitely better than the old method of disposing of the refuse by barging and railway conveyance to a distance, etc. The paper was illustrated with diagrams of the different forms of destructor now in use.

The next paper was read by Th. Wegl (Berlin) on

The Cleansing of the Streets and Removal of Household Refuse in German Towns.

1. With whom does the responsibility for the cleanliness of the streets rest? (*a*) Thoroughfares and foot pavements. The principle generally acted on is that the persons resident in a street, and not the owner, shall be responsible for its cleanliness. In spite of this, however, the cleansing of the streets is in most of the large towns undertaken by the municipal authorities. In other towns only a part of the roadway is cleansed at the expense of the authorities, the houseowners (resident) being responsible for the remainder. Moreover, the authorities have also undertaken the cleansing of street-gullies, of public urinals, etc., the watering of the streets, and in most cases the removal of snow, etc. As a general rule tramway companies are obliged to contribute towards the cost of the cleansing of the streets. The cleansing of the footways and pavements is left to the resident householders. In Berlin and other large towns the pavements also are cleansed by the municipal authorities. (*b*) Household refuse (dust). The removal of dust has in many cases (*e.g.*, in Berlin) been left to the house owners; the town authorities, however, retain a right of supervision. In cases where the contract system obtains (*vide infra*) the contractor undertakes the removal of dust as well.

2. Who carries out the cleansing of (*a*) streets, squares, etc.? Some German towns, such as Bremen, Cologne, Munich, make arrangement with contractors for the removal of all street refuse at a fixed rate (Contract System). In other towns (Berlin, Hamburg, Breslau, Frankfort-on-Maine, Hanover, Leipzic) the cleansing of the streets, and the watering of the same, etc., is carried out by the town authorities (Municipal Sestom). The necessary plant, such as brooms, barrows, street-sweepers, dung-carts, watering-carts, snow-ploughs, etc., are the property of those by whom the cleansing is carried out. The draught animals do not seem to be in any case the property of the municipal authorities. Of 23 German towns, with a population of 1,000,000, in the year 1890: 13 employed municipal labour alone, 6 employed municipal and private labour, and 7 employed private labour alone.

3. Time at which the cleansing is effected, and frequency of same. The cleansing of the streets is, as a rule, only done at night, and the removal of refuse is also performed either at night or in the early morning. The frequency with which each street is cleansed depends upon the amount of traffic on the same. In Berlin one-third of the whole area is cleansed daily. In Hamburg one-fourth of the whole area. Household refuse is removed usually three times a week.

4. Comparison between the employment of manual and mechanical labour in the cleansing of the streets.

	Cost per Hectare.	
	Manual Labour.	Mechanical Labour.
Frankfort on-Main	11 Marks.	6·8 Marks.
Berlin	32 ,,	18 ,,

5. Disposal and Utilisation of Street and Household Refuse.—Under the system of municipal working the utilization of refuse has up to the present been comparatively restricted. It is carted off to dust heaps and there left to so-called natural influences. ("Natur-forschen"). From April, 1892, onwards the city of Berlin proposes to spread out its street refuse over some waste lands at a considerable distance from the city, so as to raise this low-lying and unproductive land to a higher level, and otherwise improve it. Under the contract system the contractors sell the household and street refuse as manure. The plan of separating the rubbish into useful and worthless parts does not obtain to any great extent in Germany. There is an establishment in Berlin for burning the refuse, but it is merely experimental.

The next paper was read by J. F. Meyer, Chief Director of the Department of Streets and Sewers in Copenhagen, on

Burning of House Refuse: Experiments made in Copenhagen, Denmark.

The old methods of getting rid of the house refuse must be abandoned. From a sanitary point of view the destruction by fire is the most satisfactory. In England the house refuse contains much more unburnt coal than in most of the cities on the Continent; it is therefore necessary to try if the burning, which is practicable in England, can be applied also on the Continent. To try this the experiments were made. A temporary furnace, arranged like a single cell of a Fryer's Destructor, used. The experiments may be divided into three classes, viz.: 1. With the house refuse without any special preparation. 2. With the house refuse]mixed with fuel, coke, breeze. 3. With the riddled house refuse. 1. The combustion of the unprepared house refuse was unsatisfactory; the mass would not burn continuously. 2. With the mixture in the proportion of one of fuel to four of refuse, the results were satisfactory, but this method cannot be recommended. 3. It was easily seen that to a great extent it was the large proportion of earth, sand, and fine ashes in the house refuse, which prevented its combustion. In using a riddle, through which about one-third to one-fifth volume was separated, a fully satisfactory result was obtained. The separated part consisted of sand and fine ashes, and a small quantity of organic matter, which, as was proved by some separate experiments, was easily made innocuous.

Refuse Burning.

By W. Geo. Laws, M.I.C.E., City Surveyor,
Newcastle-on-Tyne.

The refuse of towns does not vary much in quality, nor in quantity per head. It is broadly divisible into three classes, sound material, crude manure and unsound stuff. The last is the most difficult to dispose of; the proportion it bears to the whole varies with mode of collection, though not much; is about one-third of the whole. The hope of utilising this third is fallacious. Theory of treating it by separation, mixing, or otherwise, very plausible; practice shows the cost rarely falls below realisable value, and generally far exceeds it. Experience leads those who deal with it to the conclusion that true economy lies in getting rid of it as cheaply, but with as little handling as possible.

There is a difficulty of finding sites where it may be safely dumped; objection of sanitary authorities to these deposits. Sending it to sea not possible for inland towns; not advisable even where possible. Destruction by fire the only alternative. Refuse destructors a clumsy expedient, and not a cheap one—not at all popular. They are, however, fairly effective, and less costly than more effective methods. The popular prejudice is unreasoning and unreasonable, but not the less formidable for that. The destructor furnace not much improved on; complications increase cost without improving result. The causes that have led to complaint are the spreading of dust owing to too small area of chimney and too rapid current. State of material burnt; percentage of water; this must be driven off, steam and fume being produced. The fume cremator:—Burning capacity of the furnace is about 6½ tons per cell per day, or 2,000 tons per annum; if forced beyond this, the stuff is not properly burnt. Residue about 30 per cent.; if properly burnt, is a hard and useful clinker, and sound dry ashes; and may be used for various municipal purposes. The results of five years' working in Newcastle; quantity burnt, and cost of operation: Capital cost of works, £5,060; if doubled, will cost £8,000.

How Best to Dispose of the Refuse of Large Towns.

By Miller Bruce, M.D.

This question has now narrowed itself down to destruction by fire. It has become impossible to deal with the many and various waste products of the household, in cities, by any other means. Their value as manurial agents is equal to the cost of transport, and year by year the sums paid to the dust contractor for his trouble in disposing of refuse increases. Such being the answers to our query, what then is the best form of destruction? Is it to be one large or many small destructions? The objections to large destructions are (1) the great bulk of the products to be dealt with; (2) the great expense of transport of the material to be destroyed; (3) the dangers of diffusion of disease, the necessary offensiveness of the process, and the noise of perpetually rumbling carts along the route traversed. The advantages of small local destructions would be proximity and the saving of the expense in great measure of cartage. It has occurred to me that the best form of destructor would be a portable steam engine, provided with a suitable firebox, into which all combustible matter (almost everything, given sufficient heat, is combustible) could be thrown. The heat generated by the burning of the refuse would, I calculate, be almost sufficient to propel the locomotive. Trucks would be attached, into which the cinders might be passed, and this latter could be stored at suitable depots, such as railway stations. The plan of operation would be something like the following: The traction engine would start each on its rounds at twelve o'clock at night. As it passed along a particular street (notice having been previously given of its route), the ashes and other matters would be taken away in buckets of a suitable kind and emptied into the furnace, and so, progressing slowly, the engine would finish its rounds about 5 a.m. next day, The chief difficulty would be the smell of the gases set free. This need not trouble much; first, as almost all the houses would be shut up as it passed along, and second, effectual means by steam jet or otherwise can be easily devised so as to make sure that every inch of gas is burned up before being allowed to escape into the atmosphere. No doubt a certain amount of noise and vibration would accompany the process. These might be met by special construction of the engine; by cushions of steel so to speak on the wheel. On the whole it may be safely asserted that the noise and vibration would be less than the noise and rumbling of carts. It would be very easy to show how this process of disposal of waste would be cheaper. Take the tons of waste paper alone and the bulk it occupies, carried miles and miles away, when it could be disposed of so easily by incremation. It is not altogether a far-fetched idea in times of plague and pestilence that cremation might thus be brought to the very doors where death and disease were playing havoc, and all traces of their progress at once dealt with and disposed of.

The discussion was commenced by

M. Maignon, who said that the liquid refuse of Paris was used as a manure, and that the smell was prevented by disinfectants during removal.

Mr. H. Wylie said that Manchester was the first to erect a destructor.

Mr. Washington Lyon said that although some districts in London had adopted destructors, they do not use them in a proper manner.

The discussion was continued by Mr. Alliott, of Nottingham, and Mr. Hall.

Mr. Jones replied.

The section then adjourned, a great number of the members going down to Ealing to see the destructor described by Mr. C. Jones.

SECTION VIII.—NAVAL AND MILITARY HYGIENE.

The meeting commenced about half-past ten, under the presidency of Lord Wantage, and later on the chair was taken by Dr. B. H. Thomson, delegate from the Marine Department of the Netherlands.

Before the reading of the first paper Dr. A. Harris exhibited a model of a ship's ventilator which could be made to act either as "exhaust" or as "downcast."

A paper was read by W. Spooner, L.R.C.P., M.R.C.S., etc., on

Dietary Scales in Connection with the Health of Seamen.

He first gave as a type of the good old-fashioned kind of food which many of our sailors have to put up with even now as follows: bread, 6 lbs.; beef, 6 lbs.; pork, 3¼ lbs.; flour, 1½ lbs.; peas, 1 pint; tea, 1 oz.; coffee, 3½ ozs.; sugar, 1 lb.; water, 21 quarts, weekly.

This is by no means exceptional, but is the one signed for by the crew in the majority of English ships; and, although it might, perhaps, rejoice the soul of Mr. Banting, it cannot be considered of a luxurious nature. It is quite true that on many ships some extras are allowed; thus, very often a fresh mess, composed chiefly of soup-bouilli, is given on Sundays in addition; occasionally preserved meat is substituted once a week for salt; sometimes a certain quantity of butter is served out instead of a portion of meat, whilst some extravagant shipowners have even gone the length of giving marmalade and pickles. Such unwonted generosity is, however, by no means universal. In the articles of agreement at the different shipping offices skeleton scales are now kept ready printed at the instance of the Board of Trade, and in these scales are a number of blank columns to be filled up if the shipowner desires. These columns are headed respectively, soup-bouilli, preserved meat, preserved vegetables, rice, oatmeal, butter, molasses, etc. Until the last few years however, and even now very frequently, as far as I have been able to ascertain, these columns remain blank, and the above articles are conspicuous only by their absence.

In considering the above scale of diet, it at once becomes apparent to the scientific inquirer, that it has been constructed with a total disregard to the physiological wants of the system; that in addition to its monotonous character, its excess of salt meat and lack of vegetables, the proportion of the different ingredients is altogether wrong, the errors being (1st) the monotony of the diet, (2nd) the excess of salt meat, (3rd) deficiency of vegetable food.

4th. Improper proportion of the different ingredients.—Bearing in mind, therefore, the principles enumerated, I drew out a scale for the Board of Trade, which I considered, though by no means perfect, would answer the purpose sufficiently well. I endeavoured to combine physiological correctness with a due amount of economy.

The following is the proposed victualling scale to be served out to the crew per week, in addition to the issue of lime-juice and sugar required by law: Biscuit, 5 lb. 4 oz.; flour, 2 lb. 8 oz.; beef, 2 lbs.; pork, 1 lb. 8 oz.; preserved meat, 2 lb. 4 oz.; peas, 1 pint; preserved potatoes, 8 oz.; preserved carrots, 1 lb. 8 oz.; butter, 6 oz.; oatmeal, 8 oz.; rice, 8 oz.; marmalade, 1 lb.; sugar, 14 oz.; raisins, 8 oz.; molasses, half-a-pint; suet, 4 oz.; pickles, 4 oz.; tea, 1 oz.; coffee, 7 oz. Substitutes.—Fresh meat to be given instead of salt, and preserved as long as possible after leaving port; fresh potatoes, carrots, &c., 3½ lbs. per week, instead of preserved vegetables, as long as they last; oatmeal may be substituted for rice in cold weather, and *vice versa* in hot weather; and preserved onions may be substituted for preserved carrots.

Since the circulation of the paper containing this scale, which, however, the Board of Trade merely recommended, there has been in many instances, especially in Liverpool, a marked improvement in sailors' food, and many firms have adopted a scale more or less allied to it, and some even more liberal. I may mention especially the British Ship Owning Company.

The scale was circulated in 1883, and since that date the number of outbreaks have been reduced by more than half. These facts speak for themselves. I have no hesitation in saying that if some such scale (the above errs, perhaps, on the side of economy) were made compulsory, the health of the British mariner would be very much improved, and scurvy would in a short time be totally eradicated, and remembered only as a curiosity of the past, a relic of a barbarous and unscientific system of feeding. That this end may shortly be obtained is, in the interests of the seamen and of the shipowners themselves, "a consummation devoutly to be wished."

Dr. Rae, M.D., F.R.S., said: I was employed as surgeon in the Hudson Bay Company's ship "Prince of Wales" in 1833 4, when 20 years old. Our ship was stopped by ice, and obliged to winter at Charlton Island in Hudson Bay. The ground on the island was covered with snow to the depth of about a foot when we landed, so no knowledge could be obtained of what berries grew there. Our provisions were salt beef, salt pork, and salted geese—a very common food among the employès of the Hudson Bay Company, in whose service I was surgeon for 20 years after the date mentioned. We had a little lime juice and a few potatos. The first was judiciously used, and the latter were sliced up and eaten with vinegar as soon as scurvy showed itself, but with little good effect. There were 17 cases of scurvy altogether in a party of 30 men, 9 or 10 of whom were passengers going home to England after some years' residence in the Hudson Bay Company's service. These men, if attacked at all with scurvy, had it but slightly. No fresh game of any amount could be obtained, and things went from bad to worse. The captain (Hamwell) and first mate were the first and also the only victims. The captain's case was scurvy, but complicated with other disease, but the mate's disease was scurvy *per se*, and it was frightful. He actually became black or dark blue and putrid. The odour was so offensive that no one could lift the poor man out of bed but myself. The sailor who made up the bed became sea-sick afterwards. The other patients had the usual serious symptoms of coloured and cramped limbs, teeth falling out, etc., until by accident, when taking a walk on snow-shoes, a red spot appeared in the snow, which, on inspection, I found was caused by cranberries, and they were abundant. From this moment improvement in all my patients began, and by the time the ship had been prepared for sea all the crew were fit for work, but minus many of their teeth. During two winters in the Arctic my party lived practically without vegetables, but our provisions were fresh, and all killed by ourselves. The Eskimos largely use the contents of the deer's stomach in the winter time as a vegetable, chopping a piece off, and eating as we do bread. I strongly recommend cranberries as part of the ration, both in the Navy and in the Mercantile Marine. They are easily preserved with a little sugar.

Dr. Collingridge said: If the paper had no other purpose than to dispel the extraordinary opinion still existing even among ship masters and owners, the very persons affected, that the diet scale is a compulsory one and insisted upon by the Board of Trade. There can be no question as to the absolute inefficiency of the diet scale as laid down in the ordinary agreement, but one must not forget that even this is not obtained at its "paper" value. The inspection of food as supplied to merchant ships is still practically non-existent, and some radical change in this direction is still sorely needed. Meat and bread especially, need careful attention in this respect. Reference to the statistics already quoted will show that the first effect of the Merchant Shipping Act, compelling the daily issue of lime juice, was to greatly diminish the number of outbreaks of scurvy, but these same statistics will further show the tendency of shipowners—from, I believe, pure ignorance and carelessness—to consider that the Legislature by this regulation has, as it were, taken charge of the health of crews, and thus relieved them of any responsibility. It is almost a natural conclusion of lime juice is declared to prevent scurvy and maintain men in health then the ordinary scale ought to be amply sufficient. Thus the number of outbreaks increased up to 1883, and the further fact that the mere recommendation by the Board of Trade of Dr. Spooner's scale shows only that ship-owners not only need, but seek advice, and accentuates the responsibility of the Board. It is greatly to be hoped that the Board, realising its duty in the matter, will take the further important step of issuing a compulsory rational scale. This would be actually welcomed by owners who have already given ample proof of their willingness to do anything reasonable for their employés. I would further, in reference to the figure in Table II, note that 88 per cent. of the vessels entering London carry the British flag.

C. J. Swanston, Esq., C.B. (Board of Trade): The dietary scale is not at present compulsory, and power would have to be given by Parliament before the Board of Trade could force a scale upon the mercantile marine. The present scale is a matter of contract between the owner and master of a ship and the crew, and the action of the Board of Trade officer is confined to seeing that the crew perfectly understand what the diet scale for the voyage is, and have an opportunity of objecting or declining to sign. The Board of Trade have taken the utmost interest in the health of the mercantile marine for many years past. It was at their instance that the Merchant Shipping Act of 1867 was passed, which contains special provisions for securing the health of seamen; and the reduction in the cases of sea-scurvy in recent years, shewn in the tables quoted, may fairly be attributed to this measure—at least, to some extent. But diet is not the only element involved in this question of health of crews. Many of the victims have been found to be men whose health had been debilitated by previous debauchery ashore; and while the healthy members of the crew have resisted the effects of unusually protracted voyages, bad water or provisions run short, their diseased colleagues some time have fallen victims, and the ship had been classed amongst the list of scurvy cases. The Board of Trade have, however, endeavoured in recent years to improve the arrangements connected with the discharge of seamen. Under these improvements seamen are now able to go straight away to their homes instead of having to remain strangers in a seaport subject to all the vicious attractions provided for them by the crimps. Seamen have, to a very considerable extent, taken advantage of the facilities now existing for proceeding at once to their homes, and it cannot be doubted that their health has improved in consequence. The reduction in the length of voyages, now that sailing vessels have been to a great extent replaced by steamships, cannot fail to have a salutary effect upon the health of seamen. In nearly every case of sea-scurvy official inquiry is made by officers of the Board of Trade.

Brigade-Surgeon Burton-Brown: I consider that the subject of proper ventilation of berths on shipboard is of much importance in the prevention of scurvy. In 1858-9 I took medical charge of 250 soldiers from Gravesend to Calcutta. The voyage lasted five months and twelve days; they only touched at the Cape, and there was scarcity of water before we reached there, and of food afterwards, but no case of scurvy occurred, and no death from any disease. I attribute this to the means employed to purify the air between decks by using a thermantidole, that is a wheel carrying fans in a case, and connected with a windsail up a mast, and a canvasdole 'tween decks. A corporal's party of four worked the machine, each man for a quarter of an-hour, and each party relieved every three hours. The exercise did the men good, and the air kept the 'tween decks sweet, and no scurvy occurred, though the men lived on salt provisions.

Miss Helen Taylor: I wish to suggest the necessity of the appointment of a medical officer, a coroner at every port, whose duty it shall be to inquire into the cause of the death of every seaman who has died in the course of the voyage on board each ship which comes into port. We have heard here to-day how largely even scurvy is dependent on general sanitary conditions as well as food, and on the quality of the food. Even if the Board of Trade issues obligatory scales of diet and sanitary regulations, these can be evaded, and the responsibility for the consequences in the health of the sailors thrown by the shipowner on the inefficiency of those regulations. For example, with regard to lime-juice, it is said that some of the lime-juice served out on board ship is utterly useless either from age or original inefficiency. It is plain that the most effectual way to secure healthy conditions on shipboard is to make the shipowner responsible for the injurious consequences of their absence. If a coroner found from the evidence of the fellow seamen that no complaints were made as to these, the matter would drop, but when there was a concensus of evidence as to unwholesome food and insufficient numbers of crew, exposing each man to overwork, fatal to health, or to any other insanitary arrangement, then the verdict of the coroner's jury would bring home to the shipowner the responsibility through the neglect or otherwise of the death of the men on board his ship. This responsibility would quicken his zeal to secure obedience not only to specific regulations imposed by Government, but also the sanitary conditions imposed by medical experience.

Mr. B. Tomatsuri gave the result of personal observation whilst acting as surgeon on various Japanese vessels.

Dr. Spooner replied.

Mr. John Curnow, M.D. Lond., etc., communicated some statistics of the medical cases (1880-1890), and of cases of scurvy (1852 1890), admitted into the Seamen's Hospital, Greenwich, and into the *Dreadnought*.

Dr. Collingridge, Medical Officer of Health, Port of London: The figures of Dr. Curnow are so striking, especially with reference to the incidence rate and death rate from phthisis among our merchant seamen. Few facts in sanitary science are more clearly demonstrated than the immense influence of breathing foul and impure air in producing lung disease of all kinds, but especially phthisis. The space allowed by law to the British sailor is only 72 cubic feet, and this space not only very imperfectly ventilated, but also highly charged in the case of lower forecastles in wooden ships, with organic impurities. The difficulty of keeping these small, confined, irregular spaces clean is well nigh impossible. One has also to deal with the waste products of artificial light and heating by means of imperfect and badly constructed stoves. It is, therefore, little to be wondered at that lung diseases are so rife. It is fully time that an increased space should be given to seamen. I would suggest 100 cubic feet as a minimum, feeling certain that provided this were not made retrospective there would be no opposition on the part of shipowners.

Notes on the Effect of Improved Sanitation on the Public Health of Seaport Towns.

By Edward Walford, M.D., D.P.H., Camb., Medical Officer of Health for Cardiff.

The sanitary arrangements of our ports, which form, as it were, our first line of defence, and upon which our security from invasion must greatly depend, are matters which concern the whole nation. These methods of prevention having, in our case, proved so effectual in regard to the saving of life from cholera and other allied diseases, we would fain see them adopted by other nations in lieu of the restrictive, inconvenient, and apparently useless regulations of quarantine. Practically, we have long since relinquished any attempt at imposing quarantine in any of our ports, and the only remnant of this system which remains is the old Quarantine Act of George III.

In the place of resisting disease by military cordons by land and by unjustifiable detentions by sea, we rely on internal sanitation, on the provision of pure water and efficient drainage, and on the removal of all decomposing and harmful impurities from the neighbourhood of habitations.

The town of Cardiff was at one time notorious for its heavy mortality from preventible diseases, and on the occasions of the earlier visitations of cholera to this country it suffered far more severely than the majority of English towns.

From Dr. Buchanan's well-known report on "The Results obtained by Local Authorities in their Endeavours to Improve the Public Health in their Districts," it would appear that during the epidemic of 1849, amongst the towns mentioned in this report, Cardiff, with the one exception of Merthyr Tydvil, suffered more than any other locality. Out of a population of 16,693, 351 deaths from cholera occurred, giving an annual death-rate of 208 per 10,000 of the population. During the same epidemic, the cholera death-rate in England and Wales was 30 per 10,000. In the towns referred to in that report the cholera death-rate ranged from 267 in Merthyr to one in Leicester per 10,000 persons living. The next epidemic of cholera occurred in 1854, and caused in Cardiff 172 deaths amongst a population of 22,464, equal to an annual death-rate of 66 per 10,000 of the population as compared with 11, the death rate per 10,000 in England and Wales. In 1866 this country was visited again with cholera, which caused in England and Wales 14,371 deaths, equal to an annual death-rate of 7 per 10,000 of the inhabitants. In Cardiff, amongst a population of 35,796, 44 deaths took place, giving a death-rate of 15 per 10,000.

Summarising the above, we find that as regards England and Wales the death-rate from this disease per 10,000 persons living, which in 1849 was 30, was reduced in 1866 to 7, whilst in Cardiff the death-rate, which in 1849 was 208, was reduced in 1866 to 15 per 10,000.

In London the cholera death-rate was reduced from 51 in 1849 to 18 per 10,000 in 1866. Since this date cholera has never succeeded in gaining a footing in any part of this country, although the infection has been frequently brought to our shores. In 1884 four infected vessels came into the port of Cardiff with cases of cholera on board, and in 1885 five cases were imported into the district. These cases were dealt with in accordance with the Cholera Regulations of the Local Government Board and no further cases of the disease arose.

Turning now to another disease, which in point of accusation is closely related to cholera, it would seem that the same measures which prevailed against cholera have been equally useful in protecting the community against enteric fever. Doubtless the same unwholesome local conditions which produced so heavy a mortality from cholera in former years assisted in the development of enteric fever. The disease was certainly at one time excessively fatal, as shown by the average annual death-rate during the ten years 1845-54, which was 19 per 10,000 of the population. This rate was reduced to 3 per 10,000 in the decennial period 1874-83. The death-rate from enteric fever in England was reduced during the same period from 11 to 3 per 10,000. Now what were the local circumstances which co-operated to produce this progressive immunity from these diseases? It is stated on good authority that cholera prevails in excess on the margins of rivers, where there are large seaport towns having aggregated, badly housed, immoral, and closely packed populations, that it selects low, wet, sodden, and corrupt sub-soils occupied by a dense population. Cardiff at one time undoubtedly presented some, if not all, of these characteristics. In the year 1849, at the time of the first visitation of cholera of which we possess any reliable information, its sanitary condition was as bad as possible.

The water supply was derived from shallow wells, and was grossly polluted with excremental filth which percolated from cesspools and privies; no proper system of sewerage was in existence, and no removal of domestic refuse was attempted. The roads were not macadamised, courts and alleys were dirty and crowded, the atmosphere and the soil generally were in an unwholesome and polluted condition. A large immigration of paupers from Ireland had taken place in the previous year, and overcrowding, with its attendant evils, was frequent. The second epidemic in 1854 occurred before sufficient time had elapsed for the completion of any public sanitary works, but on this occasion the use of polluted well water was, as far as possible, prohibited in those districts chiefly affected, and a temporary supply of filtered river water substituted; a certain amount of street cleansing was undertaken by the sanitary authority at this time. Between this and the time of the next visitation of cholera, in 1866, very considerable changes had been effected in the state of the district; probably the most important of which was the construction, in 1857, of public waterworks, and the constant supply of pure water. In 1855 the first section of a general sewage scheme was completed, and before the year 1860 the greater part of the town was efficiently sewered, and the majority of cesspools were abolished. Shortly after this a regular system of scavenging was adopted, common lodging-houses were registered and supervised, nuisance bye-laws were enacted and enforced, and, generally, the sanitary administration of the district was perfected. On the occasion of each epidemic of cholera the mortality fell chiefly on those localities in which the insanitary condition was most marked; the disease in preference selected houses and districts placed on the lowest and most unwholesome site, occupied by the poorest and dirtiest of Irish labourers, which had in 1848 been visited by an epidemic of typhus fever. Generally, the effect of improved sanitation in this town may be shown by the fact that the general death-rate, which in the 10 years ending 1854, with a population of 20,000, was 327 per 10,000, was reduced in the 10 years ending 1889 with a population of 130,000 to 197 per 10,000, and that the death-rate from the chief infectious diseases was reduced from 98 to 31 per 1,000 during the same period. Similar, and in some cases doubtless better results have followed the efforts of local authorities throughout the kingdom to improve the sanitary condition of the districts within their jurisdiction. But whilst the improved sanitary administration of our urban and rural districts has of late years so greatly benefited the public health, practical hygiene, as applied to our floating population, has, I think, in some respects hardly kept pace with modern scientific knowledge. May not this be due, to some extent, to a system which divides the responsibility as regards health matters between three different public bodies? The Customs, the Board of Trade, and the local authorities have respectively sanitary functions devolving upon them which might, I would submit, be more efficiently performed by one undivided authority. The disadvantage of this division of labour becomes apparent on the perusal of the reports on the sanitary survey of port and riparian districts by the inspecting officers of the Local Government Board, wherein we find it recorded that "a notable number of authorities, some of them acting for districts with a considerable amount of shipping trade, were found to have done nothing in the way of inspection of vessels, and that the riparian authorities generally have taken no means to ensure the wholesome condition of vessels." Here we find that one of the most important functions of a sanitary authority was entirely neglected, the inspection of shipping, by which means only a prompt detection of the presence of infectious diseases was to be expected was not attempted, for the most part probably because these authorities did not recognise their responsibility, or because they considered that this was a matter which concerned the Customs authorities only. Then again, it must be admitted that the question of ventilation is not on such a satisfactory footing on shipboard as on land. What can be more illogical than to allow a cubic space of seventy feet as sufficient for a sailor in his sleeping apartment, and to require five times that amount for him when he resorts to the boarding-house?

Another weak point in our coast defences against disease may be mentioned. Perhaps there is no question of greater importance with regard to the shipping than that of the water supply, and yet it would seem that the Legislature has generally provided no means by which a local authority can compel the master of a ship to empty and cleanse his polluted water tank, and take on board a pure supply of water. In the case of some port sanitary authorities special powers have been conferred for this purpose by the Local Government Board, but generally the Public Health Act gives no such powers. I am not aware that any great practical inconvenience has resulted in consequence of this legal disability; but this is due doubtless to the good sense of shipowners and masters, who usually manifest the utmost willingness to carry out the reasonable recommendations of sanitary authorities.

Professor LANE NOLLER: I regret that some naval officer is not present who could give us information on this subject. I have never found it difficult to obtain any instrument in the army, and I feel sure that the same plan exists in this country. I think in so small a meeting as this that it would not be advisable to press such a resolution as this.

Surgeon-General MARSTON said that he thought before any resolution of the kind is put, we should consider its practical bearing, and the possibility of its application to our large public services, Naval and Military, distributed over all parts of the world.

Dr. HARRIS, in the course of his address, supported very strongly the view put forward by the reader of the paper (Dr. Walford), and then proceeded to emphasise the necessity for the principal town on the river or in the port to be the authority for the administration of sanitary matters. Dual control was an evil, and led sometimes to difficulties which could not arise if the management were in the hands of the principal authority. The dual authority had been done away with in Sunderland under a local Act of Parliament in 1885, and since that time the work had been performed most efficiently. Before concluding, he alluded to Dr. Armstrong's work on the Tyne, and advised the members of the Congress to visit the floating hospital.

Dr. **STOPFORD TAYLOR** fully concurred with the views expressed by Dr. Walford as to the great advantage of the union of the Urban and Port Sanitary Authority. He took exception to the want of power to compel the captain as the occupier of a ship to cleanse the interior, and give the crew a good supply of water. By the Public Health (Ships) Act a vessel lying in any water within the district of any authority can be treated as a house within the district, the power of the Public Health Act can be applied.

Dr. **WALFORD**, in reply to a statement that a Sanitary authority has power to compel the master of a vessel to cleanse his water tanks and to furnish a pure supply, was of opinion that unless the impure water could be considered a nuisance, the nuisance clause did not apply.

In those cases where special powers are given, the 70th section of the Public Health Act gave, he said, the necessary authority.

Don **MODESTO MARTINEZ** (Pacticeo) then read a paper, accompanied by plans, etc., of a new military hospital on the point of completion in Madrid. The plans, etc., were kindly presented to the President.

Dr. **GEORGE CUNNINGHAM** next read a paper on "Dental Reform in the Navy."

SECTION IX.—STATE HYGIENE.

Dr. F. W. **BARRY**, Vice-President of the Section (Inspector of the Local Government Board), took the chair. He announced that, having regard to the plethora of business, a meeting would be held to-morrow (Friday) afternoon at 2.15, and the third part of this morning's programme, viz., the papers and discussion on the need for popular instruction in hygiene and physiology in regard to health will be taken then. The press was asked to make this widely known, as it was difficult to get notices printed in sufficient quantity.

DISPOSAL OF THE DEAD.

The **CHAIRMAN** then called on Sir **HENRY THOMPSON** to read his paper on

RECENT PROPOSALS RELATING TO BURIAL AND CREMATION, AND THE IMPORTANCE OF DISINFECTING ALL BODIES DYING FROM INFECTIOUS DISEASE, WITH REMARKS ON THE PRESENT SYSTEM OF CERTIFYING THE CAUSE OF DEATH.

I propose to assume, in order not to occupy unnecessarily your valuable time, that there can be little or no difference of opinion regarding the accuracy of the following proposition.

That the bodies of those who have recently died by any or almost any of the diseases generally known as "zymotic," and thus classified by the Registrar-General in this country, are charged with elements which have the property of communicating the same diseases to the bodies of living persons, if brought into contact with them, whether by inoculation or by food-admixture.

The group of diseases defined as "zymotic" is generally held to be formed chiefly by the following: Small-pox, measles, scarlet fever, diphtheria, whooping-cough, typhus, enteric and continued fevers, with some forms of diarrhœa, and cholera.

In considering the mortality from these diseases, occurring under ordinary circumstances in this country, it will be desirable, first, to state what is the mortality arising from all causes, and then to ascertain the proportion which the group in question bears to the total.

The official reports of the Registrar-General for the last three years will show this, extracts having been prepared for the purpose. No special outbreak took place, and the average was rather lower than had previously been recorded.

From these reports it appears that the mean mortality from zymotic diseases during the last three years amounts to 68,382 per annum in England and Wales alone. Of this large proportion, namely, more than one-eighth of the total mortality, it must be pointed out that each case was not merely a focus of infection while living, but was capable of actively propagating disease after death. At that period this activity is at its maximum, becoming less from various chemical changes which follow their natural course afterwards, largely, no doubt, through oxidation from exposure, the nature of some of these changes not having yet been completely studied and ascertained.

For the sake of the living and healthy population, the question of rendering those dead by zymotic diseases innocuous is one of supreme importance. The nearly 69,000 foci of communicable disease scattered annually throughout our country cannot fail to extend injurious influences to others. It is not too much to say that this large number of deaths from maladies which are mostly preventible is itself partly due to the fact that the dead body is permitted to propagate disease to the living. Could we arrest at once and completely the injuriously active forces which pervade it, a marked diminution would be apparent in the progress of many a local pestilence.

Questions touching the isolation of cases during illness, their sanitary condition, and the employment of disinfectants during life, have hitherto largely occupied the public as well as the medical profession; and their study has been followed by remarkably successful results. Illustrations of these it will be wholly superfluous for me to adduce. The management of infectious disease during life is not within our scope to-day. The question here before us is, "What is the best mode of arresting the progress of infection when death occurs, so that diseased remains shall not injure the living, whose right to protection is now the all-important consideration?"

A long experience has demonstrated that all methods of dealing with the dead body, which have for their object its conservation entire, when charged with infectious elements, permit these to be disseminated, and have often occasioned fresh outbreaks, especially in periods of epidemic visitation. The intricate, continuous, and universally pervading natural network of watercourse beneath the surface of the soil, associated as it is with innumerable artificial wells, reservoirs, and channels of every description, for distributing water and collecting sewage, form a system, unseen, yet scarcely imaginable in regard of its extent, by those who have not practically studied it, and realised the complexity of its ramifications. In a densely populated country this system presents, perhaps, the most formidable social health problem which the sanitarian has to encounter.

The history of the chief epidemics of the last 60 years in this country, and of the local outbreaks of fever, diphtheria, scarlet fever, small-pox, &c., offer innumerable examples of propagation and extension of these diseases, due mainly, if not entirely, to the failure to prevent poisoning of the watercourses, not only by excreta during life, but by dead bodies committed to the soil—bodies which are deposited there solely in obedience to a sentiment that it is necessary to preserve the integrity of their form and the unaltered condition of their elements—elements at that moment so destructive and so mobile.

I have no need to dilate on these facts; their fatal influence is a part of our national history.

On the other hand, I shall not ignore the fact that diseased bodies may, in certain soils, in exceptionally favourable situations, be deposited with the object just named, and that in the course of three or four years, perhaps, the chief danger may be dissipated without ascertainable harm to others. Extreme precautions must always be taken to preserve the encroachment of population on these favoured spots, or no hope of their harmlessness can be maintained.

Then in these light, dry soils and elevated spots, the most salubrious, by the way, that we possess for human habitation, for which purpose, so long as they are used as burial-grounds, they are totally disqualified, it may be feasible to adopt interment in perishable coffins or in close contact with the soil itself, and thus ensure a quicker process of decomposition of the body than occurs in heavier soil, or when it is confined in the more solid coffins hitherto employed.

But it ought never to be forgotten that the perishable coffin, if safe in exceptionable circumstances, becomes most dangerous in burying-grounds where any communication exists with the great net of water courses described, and always associated with populous districts. It is during the early weeks or months which follow death that the poison of the diseased body is at its maximum, both as regards force and quantity. You open wide the doors for the exit of such infection when you bury that body in a basket or in a perishable envelope. Better even in the interest of the living that you placed it in the much abused lead coffin, offensive as the results of changes which take place in these sealed interiors are when opened. For we have at least the right to doubt whether specific morbid germs survive for many years the remarkable organic transformation which slowly takes place within the lead coffin.

All, then, that I contend for is this: that, whatever form of dealing with the dead you adopt which demands as its primary condition the preservation of the body entire, some risk to the living is associated therewith. That risk may be minimised by certain precautions, but its amount is only a question of degree. It may be formidable, and produce lamentable results when interment is intra-mural, as many living witnesses can testify, since it was a custom not many years ago universally followed.

It is less considerable, but is often manifest in confined suburban districts, and particularly where the central concourse of inhabitants is a rapidly increasing one.

The risk and its results are obvious in many country churchyards, especially in low-lying districts on the borders of rivers and waterways, naturally for manifold reasons the favourite haunts of population. Such situations form, in fact, the sites occupied by the largest part of our rural inhabitants and by almost all our towns.

Finally, the risk is small when confined to outlying uninhabited districts with a peculiarly favourable soil. But who shall say when the minimum of risk at present there existing shall not in our populous country become manifestly greater?

Now in regard to the nearly 69,000 bodies dying of zymotic diseases, let it be observed that few of these are within reach of a choice and almost safe locality. On the contrary, they are scattered throughout the kingdom, and the majority are necessarily interred in places where the germs of disease can be readily carried into the currents of the great water systems referred to. With these existing facts before us, we have, moreover, to provide for an increasing population and for increasing occupation of the land best adapted for the purposes of habitation.

I have recently proposed, therefore, that every body dying of zymotic disease should be at once absolutely disinfected—rendered incapable of extending it—that is, as soon as possible after death, having due regard to convenience and decorum. I know only one mode of effecting this object, namely, by submitting the body to a sufficiently high temperature.

Placed in a chamber heated to something like 1500° F., about 800° C., all the fluid and gaseous matters are volatilised and escape as innocuous gases. The residue is a heap of dry white ash, absolutely harmless. An hour suffices to complete the operation, and it is in fact a process of complete desiccation and disinfection by heat. When the process is conducted in a furnace it is popularly spoken of as "Cremation." The method above described, however, constitutes the best and simplest way of accomplishing the end proposed, there being no contact with burning fuel or applied flame. I adopted it as an experiment for the first time as long ago as in 1874, by means of a Siemens furnace, and thus reduced a body containing a large proportion of adipose tissue, and weighing about 110 kilogrammes, in less than an hour, the pure white ashes weighing less than two-and-a-half kilogrammes. The cost of the proper apparatus, and the necessity for a full supply of gas by which the heat is obtained, compelled the Cremation Society of England at first, following the example of the society at Milan, to employ a reverberating furnace, the most approved form of which is now adopted at Woking, and with admirable results. But the remarkable success which has followed the society's operations renders it probable that before long the system now referred to will also be in operation and conducted under their auspices.

It is this process of disinfection by high temperature that I now propose should be applied to all bodies certified to have died of infectious disease, as an act of wise precaution and just regard for the interests of the living.

There is one other course which might be followed, less trustworthy than the preceding, but infinitely more so than burial in the most favourable soil. This is the use of a capacious coffin, embedding the body therein with a large quantity of quick lime, so as to fill the receptacle completely, and then burying in the usual manner.

I now arrive at the latter and subordinate section of my paper, the subject arising necessarily and logically from what has gone before.

In contemplating the gradually increasing preference for cremation to burial which is being manifested, especially among the educated classes both in this country and abroad, and particularly in view of the proposal to desiccate and disinfect by heat certain diseased bodies, which I advocate here to-day: it is essential to demand, at the same time, that the official determination of the causes of death should in all cases be more complete than it has hitherto been in this country. I refer you to the extracts from the Registrar-General's reports to show that in England and Wales some 15,000 deaths occur every year—about three per cent.—the causes of which have not been investigated or certified by any person. In Scotland the proportion is far larger. Even in the city of Edinburgh the uncertified deaths in the last report issued amounted to no less than 10 per cent.

Fully qualified medical men—an officer of health for example, is now to be found in almost every locality, with a district under his supervision—should be appointed so as to embrace the entire urban and country populations. His duty should be to examine and certify in every case of death, making an autopsy where desirable, determining whether a coroner's inquest is necessary, and certifying when he is completely satisfied that death has occurred from natural causes. When this officer has thus certified, cremation is to be permissible. Lastly, he should advise, and in time may probably be empowered to enforce, after death by infectious disease, the use of quick-lime, as above described, in districts without a crematory, or the process by heat where one exists.

In France, Germany, and other continental nations, an appointed examiner has long exercised the function described. In this country a certificate of death is given by the medical attendant of the deceased, if there be one. In many instances there is none; or the attendance has been insufficient to supply evidence of much value, and the duty is often discharged in a perfunctory manner unless a coroner's inquest is held, when the cause of death is carefully investigated.

I have said nothing relative to the employment of exposure to high temperature or cremation as a desirable process after death in all cases, instead of interment in earth. But it is impossible to resist the belief that the former would be preferable from a sanitary point of view. The argument which appears to me wholly irresistible in relation to bodies deceased from infectious diseases is only by some degrees less weighty in regard to death by all other causes. Putrefying animal matter is always noxious, and may be dangerous to the living; the process of desiccation and disinfection in earth must in any case occupy years for its accomplishment, and during the first period of the term much harm may arise.

The unseen and lengthy process of putrefaction in the grave is one the details of which are too revolting to be illustrated by any verbal description.

On the other hand the action of heat speedily converts the constituents of the body, healthy and diseased alike, into innocuous gases which escape without trace of smoke, odour, or offence, into the atmosphere, and into the white earthy ash already described. The atmosphere yields these gases at once to vegetable growths, which increase by absorbing them.

Finally, by this means two great advantages are secured to the public. First.—A diseased dead body is rendered incapable of communicating any malady to the living. Second.—The assignment of large and desirable tracts of land throughout the country for the imperfect and sometimes hazardous process of purification by burial in earth is rendered needless. Every acre hitherto thus devoted may in process of time be made free for the production of food; or, in thickly populated neighbourhoods, as open spaces for exercise and recreation, may be set apart for ever to promote and maintain the public health.

Mr. SEYMOUR HADEN then read his paper on

THE RATIONAL DISPOSAL OF THE DEAD: A PLEA FOR LEGISLATION.

The object of this paper, I may say at once, is to contrast the safe and rational disposal of the dead with the unsafe and irrational method of burial which we practice, and with the equally unsafe and wholly unnecessary practice of cremation. Since, however, it is not possible to deal with so large a question within the few minutes placed at our disposal, I have no choice than, by a series of short propositions having a general bearing upon the subject, to present the case to you in its mere outline, and then, by such a reference to one or more of those propositions as time will permit, to found on that reference a plea for legislation. The propositions in question are:

(1.) That the natural destination of all organised bodies that have lived, and that die on the earth's surface, is the earth.

(2.) That the evils which certain theorists would have us believe to be inseparable from the principle of interment, are independent of that principle and of our own creation.

(3.) That the source of these evils is to be found, not in the burial of the dead, but in the unreasoning sentiment which prompts us to keep them unburied as long as possible, and then to bury them in such a way that the earth can have no access to them.

(4.) That the principle of burial supposes the resolution of the body by the agency of the earth to which we commit it, and that the earth is competent to effect that resolution, and to effect it innocuously.

(5.) That to seek to prevent the beneficent agency of the earth by inclosing the dead in imperishable coffins, brick graves, and vaults, is in the highest degree irrational, since it engages us in a vain resistance to an inevitable dispensation, and has led us to accumulate in our midst a vast store of human remains in every stage and condition of decay.

(6.) That the remedy for such evils is not in cremation, but in a sensible recognition of, and a timely submission to, a well-defined law of nature, and by legislative action to enforce the provisions of that law.

I propose to-day to deal with the fifth and sixth of these propositions only, and that the connection of these two with the conclusions arrived at in this paper may be the more apparent, to remind you in the first place of the following facts: 1st. That so long ago as 1840, in consequence of the disclosures then made to them of the shocking state of the city graveyards, the Government of that day issued a commission to inquire into and report upon the subject. 2nd. That this commission, under the title of "The Board of Health," sat for fourteen years, and, by the end of the first three, that it had examined into and reported upon the whole system of cemeterial management as carried out by ourselves and by the rest of Europe. 3rd. That although, in making that examination, it must have come under the notice of the members of that commission—and that again and again—that the coffins in use in every country but our own were of a light and perishable nature—mere orange boxes in fact in comparison with those we use—the fact, nevertheless, seems to have made no impression upon them, since, in the report they issued, no reference is made to it. 4th. That, in connection with this fact, while seeing on all parts of the Continent burial-grounds far more ancient than our own, which had yet preserved their natural level, while ours had become raised many feet by the accumulation of the bodies within them—the connection in question, pregnant, as it was, with matter for reflection and suggestion, is not even referred to in the report they made, and, therefore, that no conclusions are sought to be founded on it. 5th. That although they both saw and reported that no Government but our own entrusted so important a matter as the burial of the dead to private persons, still less to undertakers, joint stock companies, and owners of ground interested in finding room in it for as many corpses as possible, and in enclosing those corpses in the costliest possible envelopes—yet they in their report formed no conclusions or made any recommendations on the subject, and in suggesting the closure of the old and the opening of similar burial grounds outside the town, that they leave the administration of those new burial grounds an open question. 6th, and finally, that the Government of that day in opening the new cemeteries in the stiffest clay, and in stipulating that they should not come within a specified distance of the town, forgot that there was nothing to prevent the town from coming up to the new cemeteries, and, as a consequence, that one of the worst of these cemeteries, containing as it does 155,000 corpses in an unadvancing state of putrefaction, is now the centre of a populous and fashionable district, and that every day of the week makes a sensible addition to the horrible quotient.

It was under these circumstances that we then began to hear of cremation. Now I need scarcely say that I attach the fullest credit to any public spirited suggestion intended to deal with so great an evil. What, however, I mean to say here of that suggestion is, that it was not a right one, and that it was put altogether out of court by the incident which I am about to describe, and in consequence of which, as the advocates of cremation very well know, was heard no more of for years; and then only again because it became evident the Government meant to do nothing.

The event in question, which put an entirely new face upon the matter, and which, though still ignored and unacted upon, is destined one of these days to relieve us of a heavy burthen, and our national intelligence of an equally heavy reproach, was this: In 1875 it had become necessary to level Holborn Hill, and to effect this to make a clean cut through the whole thickness [illegible] ent burial ground of St. Andrew's, which become raised, by the accumulation of bodies within it, as much as 18 feet above its original level. That ghastly section it was my lot to see and examine. I have elsewhere described it. It is, therefore, unnecessary to say more of it here than that, having been made from above downwards, and from east to west, it had exposed in their full length both the bodies of the dead and the coffins which contained them, and that in the exact positions they had occupied for two centuries and a-half. It was also noticeable that very little, if any, soil had been allowed to remain between any two coffins, so that, as these coffins were in close apposition, each body within them had become invested with a double casing of wood. What, however, was most noticeable was the fact that both the bodies themselves and the coffins that enclosed them were, as to decay, in much the same state as when they were first buried—in a state, that is to say, of an unadvanced and unadvancing decomposition, and, even as to this, that little or no difference was observable between the interments of yesterday and the interments of Charles II.'s time. On what, therefore, I found myself in the position of having to ask myself, did a fact in every way so remarkable depend? It was not in the nature of animal matter to remain thus unresolved. All nitrogenous matters were and must be so resolved when buried within the earth. What had we here then to account for a state of things in every way so abnormal? And then it was, and not till then, that I remembered that wood was a non-nitrogenous body, and, this being so, that it would not undergo disintegration when thus buried, and this reflection being supported by finding the very sawdust which had been used for filling in the coffins also unchanged, it was, I found, impossible to resist the conclusion that it was the hermetical enclosure of these perishable bodies in coffins that were themselves imperishable, which had arrested their decay and prevented their resolution; in other words, that it was we ourselves, by the unintelligent practice in which we were engaged, that had brought about this terrible accumulation, and, such being the case, that it rested with ourselves—and that at any moment we pleased—to undo the mischief we had done.

But if, as I think I have now shown, that it is the imperishable coffin which is the material cause of so much mischief, the moral cause of it—I regret to have to be so outspoken—is the unreasoning sentiment which prompts us to keep our dead unburied till its use becomes a necessity. Why, I again ask, the terrible cost considered, do we persist in such a habit? Why does the law, so stringent on this point in other countries, permit us to do it? The signs of death are now too well known to be mistaken by anybody. One of these signs—the *rigor mortis*—is within the recognition of anyone, and it is within the easy comprehension of everyone that it is the subsidence of this state of rigidity which is the commencement of putrefaction; and, again, that it is this commencement of putrefaction which necessitates the hermetical enclosure referred to. Obviously, therefore, what is here wanted is legal prescription—that gently imperative guidance which we all look for and find to be such a relief under circumstances which impair for a time our own proper judgment, and which at the hands of a paternal Government I say we have a right to look for. It is quite a mistake to suppose that such action would be resented. There was a consensus of opinion in its favour when I first wrote upon the subject, and there would be again the moment it was seen and understood that the Government was in earnest in the matter. Meanwhile, I hope I may be forgiven—and if I am not it matters little, since I shall so soon be called upon to illustrate my own theory—if I venture to say that I know nothing more characteristic of the kind of government we enjoy than that the announcement of a state of things at once so little creditable to our intelligence, so injurious to our interests, so obvious as to its cause, and so easy as to its remedy, should for fifteen years have been so entirely ignored as to have produced nothing better than the "memoranda" which are still issued by the Local Government Board, for what I fear I can only call improper and insanitary burial, and the unnatural, unnecessary, and dangerous proposals of the advocates of cremation.

Meanwhile, the only genuine effort which has been made to deal with that form of demoralization which more or less prevails in every house on the occasion of a death, has been that inaugurated by my able and energetic friend, the Rev. Mr. Lawrence, of Weston Vicarage, York. In the Church of England Funeral Reform Association, of which he is the founder, we have a strikingly sustained instance of such an effort, and it is with the greatest regret that I now see so excellent a movement in some danger of disruption. Such danger, however, exists, and, if I may be permitted to say so, has arisen out of a well-meaning but mistaken attempt on the part of its supporters to make it a sanitary as well as a mere movement *ad bonos mores*. For such an extension of their original scheme they must pardon me if I say that they were not prepared, and that by education and habits of thought they are unfitted. The attempt, in fact, has opened the door for the introduction among them of theories, the mischievous character of which they were not at first able to perceive, and with which, now that they have perceived it, they are unable to cope—I mean the inroad on their councils of the cremationist and the use he has made of them for the extension of his propaganda. I very much fear that unless, by a frank return to their original programme (which was merely one for the simplification of funerals and the discouragement of excess in the direction of paraphernalia), they can purge themselves of this lethal element, and so restore this otherwise excellent movement within clerical limits, it may suffer shipwreck.

Another discouraging circumstance is to be found in the conduct of that very Suburban Cemetery Company which was the first to profit and which has most profited by the practice of burial I am here advocating, and which, properly directed, and with the ground they occupy, has had and has more in its power for good than any similar association. When the Directors of the Woking Necropolis Company, acting on the suggestions made to them for the employment in their grounds of a coffin as perishable as the body it contained, patented such a coffin, they were bound, on the expiration of that patent, to throw the invention open to the world whose property it had become. As I am informed, they have not done so, and, on some excuse which I have been unable to penetrate, have renewed that patent, or sought to renew it, and so deprived the public for another term of years of the value of a suggestion which it must be remembered had been made not by, but to, them. Here, again, I would say respectfully, is a case in which the Government, by their legal officers, ought at once to interfere.

Mr. SEYMOUR HADEN next dealt with cremation, and made objections to its use, mainly on account of the possibility of concealment of crime. He considered that it should be illegal to cremate, and that a statute should be passed to regulate burials.

Sir SPENCER WELLS addressed himself to answering the objection to cremation raised by Mr. Haden. It is not more unnatural than burial in earth or the sea. He told an anecdote of Sir James Simpson, who was consulted by a lady to whom he suggested chloroform during her confinement. On her protesting that it was unnatural he asked her how she had come from Belfast. She replied that she had, of course, come from Ireland by steamer, whereupon Sir James remarked that that was a most unnatural method—the natural way was to swim. As to its being necessary, he pointed out the great sources of danger to the living from large tracts of land which are polluted by burial. Nothing short of cremation would destroy the specific germs of disease such anthrax and yellow fever. (Applause.)

Mr. Cafford (chief of the Bureau de la Seine) and Dr. Brouardel (of the Faculté de Medicine, Paris), also read papers on the subject of cremation.

Rev. Fred Lawrence (Hon. Secretary of the Burial Reform Association) pointed out that there was nothing in the Burial Service which was inconsistent with cremation, nor does it affect the creed of the resurrection.

Dr. E. Duncan (representing the Scotch Burial Reform Association) spoke of having seen 60 coffins in a Glasgow cemetery in one pit, not even covered over with earth. Out of 19,000 interments annually in Glasgow, 9,000 are buried in pits in a clay soil, the drainage from which polluted the water supply and streams of the city. Near the Glasgow Infirmary there was a small cemetery, which was found to account for the prevalence of hospital gangrene in the infirmary. The disease entirely ceased when the bodies were removed and the cemetery done away with. Many of these bodies were but little decomposed, although they had been buried many years, and in their clothes without coffins, for they had undergone partial adipocère. As examples of the evils of interment, nothing could be more to the point. (Applause.)

Dr. Franklin Parsons advocated a middle course, cremation in some and burial in other cases. Cremation did away with the chance of being buried alive; but he did not believe the dangers of burial to be so great as they had been made out. The evils very often arose from our fashion of delayed interment, and from chosing unsuitable soil, such as heavy clay soils. Suitable soils were very scarce.

Dr. Brett (Medical Officer of Watford) mentioned a case where out of four pall-bearers one had contracted smallpox in carrying a body to the churchyard. He advocated all men leaving in their wills an instruction that their bodies should be cremated.

Dr. Thorne Thorne then took the chair.

Mr. Paton Buchan, Registered Plumber of Glasgow, could see no reasonable evidence against cremation, though he had followed Mr. Haden's paper very closely. He could not help thinking that no one would like to see their own or other people's bodies desecrated—(laughter)—but there was no desecration in cremation.

Surgeon-Major Inch wished to make one remark on this *grave* subject. (Laughter.) He thought that the idea of spores was all rubbish. How was it that clergymen were as long lived as they were—longer lived than any other class—if they were continually exposed to infection?

Dr. Samuel Abbob (of Boston) and Dr. Willoughby (of London) spoke, and

Sir Henry Thompson, in his reply, said there was but little left to reply to. One point only needed reply—Mr. Haden had said cremation was a direct incentive to crime. On the contrary, cremation was a preventive if the system at Woking was carried out—*i.e.*, only after a thorough inquiry into the causes of death. As to the medico-legal argument it was straining at the smallest of gnats and swallowing of the largest of camels. Inquiries had been addressed to over 300 coroners, and resulted in the fact that in the course of 20 years in England and Wales only 100 exhumations had taken place for medico-legal purposes, and out of that number only 20 (or one per annum) had been exhumed for suspected poisoning, and for this small matter 70,000 bodies dying of infectious disease per annum were to be allowed to contaminate the ground. Again, how scarce, how very scarce, was the proper soil in which burial could properly take place. With proper precaution, and due inquiry into the cause of death before burning, cremation was the only solution of the difficulty. He concluded by moving the resolution below.

Mr. Seymour Haden, in his reply, said that if cremation were adopted there would be far mere applications than one per annum for exhumation. The earth was the best and most natural disinfectant. Was it not by its means that the resistant germs of anthrax had been destroyed? As to the pollution of water, was not the water from Aldgate pump quite near a graveyard, yet one of the most wholesome in London?

But Mr. Ernest Hart intervened, and said that at his instigation that pump had to be closed because of its deleterious properties, and company's water had to be laid on.

Another gentleman was heard to say, amidst cheers, that the pump was known to be the most popular pump in London.

Mr. Seymour Haden, resuming, said that it was impossible to detect crime by post-mortem examination. (Cheers, and cries of "No, no.")

The Chairman then put to the meeting the three following resolutions, proposed by M. Georges Saloman and seconded by the Hon. Secretary (Mr. Lithiby): "1. That Governments should be urged to remove all legislative obstacles to the cremation of bodies." "2. That Governments be urged to adopt cremation of bodies on the battle-field." These resolutions were carried by acclamation, only two hands being held up against. "3. That the operation of cremation should be effected with an imposing ceremonial, and the remains deposited in well-arranged monuments." This resolution was not carried.

The following resolution was proposed by Sir Henry Thompson and seconded by Mr. Ernest Hart: "That the cremation of the dead is a rational and hygienic procedure, which is especially called for where death occurs from contagious disease." This was carried with acclamation, only four voting against it. The greatest interest was shown in this discussion, and standing room could be obtained with difficulty. The audience did not fail to express their agreement with, or dissent from, the different speakers.

Education: Position and Duties of Persons Engaged in Sanitary Administration.

The chief paper on this subject was one by Geo. Reid, M.D., D.P.H., Medical Officer, Staffordshire County Council. We can only give a brief abstract of this paper. The author first detailed the duties of a sanitary inspector, comparing them with those of a polite officer, substituting disease in one case for crime in the other. A little reflection on these lines will convey an idea of the varied, the responsible, and in many cases the dangerous nature of the calling, and it will at once become apparent that special knowledge, training, and experience, are indispensable requirements in such an officer. To efficiently discharge his duties it is essential that, intellectually, he should at least be entitled to take an average place, and that, technically, he should possess, at any rate, an elementary knowledge of the various conditions upon which the hygienic well-being of the community is dependent, including the physical laws that govern all sanitary operations. In order to ascertain the present position as regards the details of administration for inspection in the various sanitary districts of England, he recently sent circulars to each inspector in Staffordshire—including those of county boroughs—containing questions with reference to the previous position and training, salaries, duties, and conditions of appointment in each case. He selected Staffordshire, partly because of his official connection with the county and partly because of the fact that its population was both agricultural and manufacturing. In addition to this, he obtained the same information from a town of upwards of 400,000 inhabitants, which might be taken as an example of most large towns. That information, condensed into tabular form for convenient reference, was in their hands. The details, however, were too numerous to admit of more than a cursory analysis in the time at his disposal. He concluded that all inspectors should be qualified by possessing a diploma, the latter only granted after a long and searching practical and theoretical examination, and added that having recently had many opportunities of judging of the work done by sanitary inspectors in various districts, the necessity which he had previously felt to exist for radical reform had been amply confirmed. The undoubted evidence of good work, in districts in which the inspector proves to be a man who takes an intelligent interest in his work and exerts himself to acquire a knowledge of his duties—and this, too, in the face of little encouragement from those in authority, for whose approval he certainly is entitled to look—testifies to the good that must necessarily follow wise reform.

Papers were also read by Messrs. **Seth Smith**, by the Company of Plumbers, the Sanitary Institute, and the Association of Public Sanitary Inspectors of Great Britain.

The discussion was carried on by Messrs. **Cade**, **Mark Judge**, and others.

It was then moved by Mr. **Seth Smith**, and seconded by Dr. **Geo. Reid**, and carried by 22 to 14, "That this meeting cordially approves the principles of statutory examinations and registration of architects."

After further discussion, a similar resolution was carried in the case of plumbers.

DIVISION II.—DEMOGRAPHY.

The **President**, Mr. F. Galton, F.R.S., took the chair at ten a m.

Mr. **Holt S. Hallett**, C.E., read a paper on

India Factory Legislation.

In the census of 1881 one-twelfth of the population of India were classed as "workers" in various materials. Of these more than 8,000,000 were females, and nearly 13,000,000 were males.

In the British Isles such workers are protected, so far as females and young males are concerned, from the exactions of their employers by our factory and workshop legislation. In India, however, where the patient endurance of the people surpasses imagination, and the sweater is master of the situation, protective legislation is refused to the great bulk of the working classes. Barely 50,000 women and children out of the 10,000,000 or 12,000,000 women and children employed in industrial pursuits have been brought within the scope of the recently enacted India Factory Act.

Under the India Factory Act all workers of both sexes and all ages who are engaged in the following works are excluded from protection :—

1. Factories employing less than 50 hands, with exceptions which may be made by local governments for factories employing not less than 20 hands.
2. Factories working not less than four months in the year, which include most of the cotton presses and ginning factories.
3. Factories on indigo, tea, and coffee plantations.
4. Workshops.

I will first deal with workshops and the minor factories which are excluded from the Act. Owing to workshops not having been brought under regulation, children of any age, from babies in arms upwards, may be employed in them for any number of hours in the day or night, and under most unsanitary conditions. After inspecting a few of these works, in which wool and wheat cleaning was being carried on by hand, and the dust was nearly suffocating. Mr. Jones, one of Her Majesty's Inspectors of Factories, whose services were lent to the Government of Bombay in 1883 for five years, described them as follows :

"1. Room, 87 feet by 15 feet by 13½ feet. Five small openings, 3 feet by 2 feet, blocked with wood, and two doors. One hundred and four women and children employed in this room, 11 children under 12 years of age, and two at the breast. Room extremely dirty.

"2. Room on the opposite side of the road, belonging to the same man. Room 84 feet by 9 feet by 10¼ feet; seven windows and three doors; walls and roof very dirty. Ninety-two women and 16 children under 12 years of age, three at the breast.

"3. Plenty of ventilation, walls and ceilings very dirty, and dreadful smell from adjoining yard; 90 women and 16 children, from two to 12 years of age, employed.

"4. All the windows blocked by bags; room perfectly dark, except at the doorway; place excessively dirty; filthy drain running between building and the next premises. I was obliged to hold my handkerchief to my face while taking down these particulars."

The condition of the minor factories is even worse than that of the workshops, because danger from unguarded machinery and untrained enginemen is added to the general unsanitary condition of the premises. These factories, besides many other works, include cotton presses and cotton-ginning factories, the majority of which work less than four months in the year.

In cotton presses and ginning factories the air is choked with cotton dust and fluff, and in the presses the work is extremely arduous. Mr. Sharpe, the engineer of Apollo Press Company, in his evidence before the Bombay Factory Commission of 1875, declared that :—

"The coolies perspire heavily and profusely, drink much water, and get tired with their work, because they are employed continually for 12 hours per day on work ten times as hard as that of mill operatives. Their working operatives. Their working hours should not be more than six. The coolies are allowed no meal hours, and take their meals as they find opportunity. They suffer from the cotton dust."

Mr. Henderson, the engineer to another press, urged that : "The operatives are not healthy, most of them suffer from asthma. The hours are too long for such heavy work. The work kills the men. They should not be allowed to work longer than eight hours. An enactment is necessary for the protection of the operatives. How can you expect to make changes without an enactment?"

No enactment was passed for the protection and relief of these operatives, so the merciless employers took further advantage of their helplessness. Before the Bombay Commission of 1884, it transpired that men, women, lads, girls, and children employed in the cotton presses and ginning factories were occasionally worked continuously for eight and ten and twelve days and nights at a stretch, with a rest of half an hour in the evening; and, as a rule, from 4 and 5 a.m. to 7, 8, and 9 p.m., without any stoppage during the day. If six or eight hours a day is as long as a man should be employed in these works, it is surely abominable cruelty to allow lads, girls, women, and children to be employed in them day after day for 23½ hours at a stretch.

The case for protecting the hands in minor factories and workshops was so strong that the Bombay Factory Commission of 1884, though largely composed of persons interested in Indian factories, allowed in their report that every work employing a single member of the protected classes ought to be under regulation. They said :—

"We are strongly of opinion that all factories—no matter what the number of hands employed—in which steam, water, or other mechanical power is used, should be under regulation, and that other places or workshops where manual labour is exercised should be brought under the law if ten members of the protected classes are employed therein. We may add that we draw the line at ten, owing to the impossibility, without more inspectors being appointed, of enforcing the law in workshops employing less hands."

To work children, young persons, and women beyond certain limits, is to work them beyond the point where work becomes cruel and injurious to the employed.

When the law is broken the operatives dare not tell the truth to the inspector, because they are well aware that if they did the manufacturer would turn them out of his works. This has been clearly proved by Mr. Jones's report, contained in the annual report of Her Majesty's Chief Inspector of Factories and Workshops for 1887.

The shift system sanctioned for India combines the evils of loose limits, with the still greater evil of allowing women and girls, as well as lads, to be employed at night. Night work is injurious and contrary to nature. Night was made for sleep and not for work. For children under the age of 21, working at night was abolished in this country by the Apprentice Act of 1802, and in each succeeding Factory Act it has been prohibited for all up to the age of either 21 or 18. In 1847 it was abolished for women in textile factories, and in 1867 for women employed in non-textile factories and workshops. At the Berlin Labour Conference it was prohibited for women and children, and for all young persons under the age of 18. In India night work is especially harmful. It is well known that more people are seized with, and die from, heat apoplexy in that country at night than in the day. It is rather late in the century for the Government of India to pass a Factory Act sanctioning night work for young persons and women!

The India Factory Act permits protected children of nine years of age to be employed without a certificate of physical fitness for 42 hours a week, notwithstanding the enormous weight of evidence given before the Factory and Workshops Acts Commission in this country against permitting any child under 10 years of age to be employed in their factories or workshops, and in face of the fact that children between 11 and 14 years of age are, by the English Act of this session, only allowed to work 28½ hours a week in textile factories in this country, and no child under 11 years of age is permitted to work in any factory or workshop.

To workmen and lads, from fourteen years of age and upwards, under the penalty of dismissal from employment if they refuse, for fourteen hours a day, in a standing position, during the hottest time of the year, with only half an hour's interval for meals and rest, and one or two necessary intervals of a few minutes for answering the calls of nature, is a disgrace to India manufacturers, and calls loudly for redress by Government legislation.

I will now treat with the statement of reasons for not applying the English Factory and Workshops Act to India, given in the despatch of the Government of India to Lord Cross, dated Calcutta, March 5th, 1889. The statement runs as follows:—

" "We desire to give expression to our view that the English Factory Acts are inapplicable to the present conditions of labour in Indian factories. It is a well attested fact that the employées in Indian factories reach a standard of comfort and content which is not attained by persons in their own ranks of life who are engaged in pursuits of a different nature. Machinery, moreover, is, owing to the comparative absence of competition, driven in the factories in India at a pace so slow that it would not be tolerated in England, and it is estimated that in many of the mills in India about twice as many operatives are employed as would be employed in mills of the same capacity in England. It follows that the work of the operative in an Indian factory is far more desultory and less exhausting than that of an operative working in England, and that provisions which are rendered necessary by the exacting nature of the labour in English mills are not demanded in the interest of the Indian operatives, who would, indeed, be prejudicially affected by them, while they would impose a needless and uncalled-for obstacle to the development of the industries of India." This statement does not stand the test of evidence given by mill managers, factory inspectors, medical men, and operatives before Factory Commissions which sat in India in 1875, 1884, and 1890.

After the two papers had been read, the discussion was commenced by Dr. BAHADHURJI, representative of Indian manufactures. In an animated speech he said he differed entirely from the views of Mr. Hallett. The Indian operatives worked from sunrise to sunset, averaging throughout the year 12 hours six minutes work a day, so that in reality the hours of work were not longer than the six to six system in other countries. Moreover, with regard to women, a special grace was allowed them, both with regard to starting work and finishing it, and they could absent themselves without being blamed in any way during the catamenial periods. The Hindoos worked intermittently, and more or less as they pleased. They came to Bombay to make money, in order to keep up their homes in the country. It was quite impossible for the English factory laws to work in India. The Factory Commission Report in India had shown that physically the mill operatives were strong and the women particularly healthy.

Dr. HENRY COOK, who said that he had been in India for 30 years, and for many years Principal of the Medical College of Bombay, regretted that Mr. Hallett had made such incorrect statements. He (Dr. Cook) considered that the mill operatives in Bombay were well fed and well cared for, they took as much leave as they chose, and worked intermittently. They worked better when the temperature was high, and preferred workshops which to a European felt uncomfortably warm, to well-ventilated ones. He concluded by saying that he felt sure any interference with the working of larger mills in Bombay would be most injudicious.

The Hon. NOWROJEE N. WADIA agreed with everything that Dr. Cook had said, and asked Mr. Hallett to go more thoroughly into the question and examine facts before he drew sensational and incorrect pictures simply from reading inaccurate reports.

Mr. ROWLAND HAMILTON, Fellow of the Statistical Society, spoke to the same effect, and said it was impossible in England to force legislation, and very much more difficult to force it in India.

Dr. ALBERT LEFFINGWELL thought that Mr. Hallett, in his paper, had correctly represented the condition of mill operatives in India.

Mr. HALLETT, in reply, said that the picture he had drawn were not a sensational or an inaccurate one, and accused several of his opponents of being paid advocates sent from India.

This was indignantly denied by Dr. BAHADHURJI and other speakers.

Sir RAWSON W. RAWSON rose to a point of order, and hoped that all personalities would be kept out of the debate.

Mr. HALLETT apologised, but had been informed that paid advocates were sent from India. He concluded by saying that many of the gentlemen who had taken part in the discussion stated that the women and girls in Bombay worked fewer hours than the men, but this was not the case in other parts of India, nor was it altogether true for Bombay.

Madame le Docteur ALEXANDRA C. KATCHEF read a paper on

HOME WORK IN RUSSIA (LES KOUSTARI).

Home workers, *i.e.*, persons who work in their own rooms, known in Russia under the name of Koustari, are in number seven and a-half millions, and produce work to the value of one and a-half milliards of roubles annually. The Koustari engage in work to supplement the revenues derived from tilling the soil, so that although in one sense artisans, they remain for the most part cultivators of the soil. Their work extends to all kinds of industries —the chief are weaving, knitting socks, lace, shoes, and various trades connected with the working of wood and iron. Their gains are small, and tend ever to decrease. Their economic and hygienic position is deplorable; yet they do not seek entrance into factories, for agriculture is the chief thing they rely upon, and should they leave their homes the land remains uncultivated. The Russian Government is interested in the fate of the

Koustari. In 1872 it appointed a commission to inquire into the question of small industries. The Commission has published 16 large volumes, and laid down the following propositions:—

1. The Koustari must be supplied with good, cheap materials and good tools.
2. They ought to be taught the best methods of work.
3. They should be furnished with good designs and models.
4. Organisations should be started to procure for them the necessary materials for production, and to give them means to obtain credit.
5. National workshops should be established.
6. Depots of the products of the Koustari should be established, so that they could enter into direct relation with the buyer.

A paper on "The Methods of Research into the Causes of Periodic Demographical Phenomena," by Professor Béla Földes, of Budapest, was then read. After this

Dr. **Joseph Körösi**, Director of Municipal Statistics, Budapest, read his paper on

The Influence of the Age of Parents on the Vitality of their Children.

The author said that the aim of his essay was to investigate whether the age of parents is of any influence upon the vitality of children and in the affirmative case, to find the statistical measure of this influence. The basis of this investigation is furnished by the data upon the age of parents who have lost children below the age of ten, which data since many years has been noted at Budapest. The observations on which the paper is based is on the cause of death of 29,813 children. If we are to recapitulate the results of our investigations, it seems possible to assert with some positiveness the thesis that—at least in our country—girls should not get married before the age of 20. If this can be maintained for the somewhat warmer climate of Budapest, where the puberty of girls appears already at the age of 13, how much more is this assertion to stand for the later ripening population of northern Europe and so also for that of the United Kingdom. The hint furnished in this respect by demology—supposed that it will be justified also by further and ampler observations—is a very important one and the less to be under-valued as it is in pretty lively contradiction with the general custom. The ideal of each mother—at least in our country—is to get her daughter married at the age of 18 or 19; girls of 20 years of age will not be in general considered as standing still on the threshold of marriable age. There are in Budapest yearly 40 couples where the bride has not yet reached her seventeenth year, 50 where she is not yet 18 and 120 where she is not yet 19 years old. The number of brides below 20 years represents 13 per cent. of the protogam brides, with the Catholics even 18 per cent., whilst with Protestants and Calvinists 12 per cent. and with Israelite only 10. Also in England 12 per cent. of the brides step to the altar below 20 years of age, and their yearly number is not less than 23,000! As to the influence of the combined age of parents, our observations may be considered as a proof of the general rule that old men ought not to marry young women. But as statistical data to prove this rule were up to now failing, it was perhaps not quite superfluous to produce them. We are thus enabled to assert, guided not only by instinct but by statistical reasoning, that women under 30 years and even between 30 and 35, would do better to avoid marriage with men above 50 years of age. But there are still two other facts resulting by our observations which—if also otherwise approved—would the more deserve some attention, as it is not probable that we could have reached them in a merely instinctive way, viz., that women in the middle age of above 35 years have to fear no unfavourable chances by choosing a husband of above 30 years, and that these same women, and even those between 30 to 35, should do better to avoid union with young men, as it seems probable that their children will be more exposed to hydrocephalus or inborn debility.

The hints resulting for the male half are already included in the foregoing remarks; they should generally renounce to the youngest girls under 20 or 19 years of age; further, if between 20 and 30, they should avoid marrying with women above 35 years of age, and, finally, if at the age of above 50 they have approached the end of male generative power, they should select no younger women than above 30, eventually about 35 years of age.

The discussion was opened by a few words from Dr. **Singer**, who remarked that the variation of mortality of children in relation to the age of mothers as shown by Dr. Körösi, might be in connection with the fact that the marriage age amongst the working classes is a comparative young one, whereas amongst those in a better social position marriage, as a rule, did not take place until a later age.

Dr. **Leffingwell** called attention to the fact that during the last fifty years the proportion of boy-labour had slowly decreased. This phenomenon was coincident to some extent to the fall in the marriage-rate. He (Dr. Leffingwell) thought it would be interesting to know if the same sociological phenomenon had been observed in other parts of Europe.

Mr. **Galton** (the President) thought that much useful information on the subject might be obtained by a careful study of well-kept stud books.

Dr. **Longstaff** stated that another series of observations were required in order to work out mathematically the exact direct influence of fluctuations in the marriage-rate upon the birth-rate. It was essential to know for each country and for the various social classes the normal birth-rate in each successive year after marriage distinguishing children born alive. The births in each year were due to marriage in many preceding years. We did not know how many resulted from marriages that had taken place in the immediately preceding years. He hoped Dr. Körösi would continue his valuable researches.

Dr. **Graulich**, Dr. **Lange**, and Sir **Rawson Rawson** also joined in the discussion, after which Dr. Körösi replied.

Professor **Guraschek** then explained the principle of an electric counting machine used in the United States census. The machine itself not being present, it was impossible to demonstrate the method of using it.

The Suitability of Tropical Highlands for European Settlement.*

By Surgeon-General Sir **William Moore**, K.C.I.E., L.H.P.

The author commenced his remarks by mentioning that the value of life in a tropical climate is less than the value of life in a temperate zone, giving several reasons therefor. It is, however, undeniable that elevation renders bearable and comparatively agreeable tropical regions otherwise uninhabitable by Europeans. This is entirely due to the fact that altitude diminishes heat. The actual temperature of elevated regions differs much from what might be inferred from latitude; aspect, proximity to the sea, forests, rainfall, physical configuration, and hemisphere being controlling conditions. But short of the snow line the climate in elevated tropical regions is still more or less a tropical one. It is the climate of the low lands, tempered by that heat diminution, obtained by elevation, increased rain-fall, and forests. To obtain a mean temperature, as that of London for instance, 51° F., a person must ascend 10,000 feet in any country where the sea board has a temperature of 80°. Although such an elevation and temperature are not essential, the evils of expanded airs are not escaped at a much lower elevation; for as ascent is made the density of the atmosphere is diminished by lessened weight of superincumbent air. The difference of oxygen inhaled at a height of 6,000 ft. is 23½ grains per hour. Many persons cannot endure elevated sites. They suffer from insomnia and a sense of constriction in the chest. Slight exertion causes fatigue; and any pre-existing heart affection becomes dangerous. Neither are elevated regions free from tropical maladies. Hill diarrhœa is a well-known complaint. Tropical elevations are not free from fever. This we know from Indian experience; Stanley Parke and Jephson were prostrated by fever on the plateau of Kavalli in Africa, 4,500 feet above sea level. Cholera has also prevailed on tropical elevations. Moreover, while tropical maladies may be met with, diseases of temperate climates are more rife on tropical elevations than they are on tropical lowlands. In India much discussion has taken place with regard to the suitable height for European soldiers. Sir William Moore long since recorded his views, that it is sufficient in India if the elevation removes the European from the stratum of hot air, and, therefore, above the influence of the fiery winds of the north and the damp heat of the south. This, however, while satisfactory for the temporary sojourn of soldiers, is not sufficient for colonisation. The still powerful sun, the rarefied air, the prevalence of marked seasonal influences, the heavy rainy season, with its attendant damp and clouds, and near the equator little or no cold weather, must eventually tend to produce anæmia and racial degeneration. What we know of the effects of tropical elevation is principally derived from experience of mountains. An extended tableland, as a consequence of greater radiation, would be, even at the same elevation, much hotter than a mountain. No colonisation has taken place in India, either on the plains or mountains, and both reason and experience forbid the expectation of colonisation of other tropical highlands by Europeans; by [illegible]tion being meant, colonisation in the sense of colonisation of South Australia and Canada and North America. An European may live long and enjoy good health on a tropical elevation, but he will not found a family. The temperate climate of elevation will not supply the place of the temperate climate of latitude. An infusion of native blood becomes a necessity for the continuance of the species. Lastly, Sir William Moore observed, that before Europeans go to tropical climates greater care should be taken to ascertain if they are fitted for such climates by temperament, constitution, absence of certain idiosyncracies, and freedom from constitutional taint of certain diseases.

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*Paper read Wednesday, August 12th.

BUCKINGHAM PALACE.—A large number of visitors have availed themselves of the opportunity of visiting Buckingham Palace since the opening of the Congress.

VEGETARIANISM.—Mr. Josiah Oldfield has published a special Congress number of the *Vegetarian*, containing, amongst other items of interest, the portraits of the following members of the Congress, together with their views upon vegetarianism, viz.: Professor A. Wynter Blyth, M.R.C.S., M.O.C., T. Castly Bailey, L.R.C.P., M.R.C.S., J. Edwin Cooney, M.D., Dr. Norman Kerr, Dr. John F. J. Sykes, Dr. Francis Vacher, Dr. Alexander Cameron.

MISSING DRAWINGS.—A collection of drawings on tracing cloth, bound in 23 volumes, and placed in a morocco case, marked "Projecto de Saniemento del Subsuelo de Barcelona," have been exhibited on a table in the reception room of the Congress. Yesterday it was discovered that nearly all the volumes of drawings were missing. If any gentleman present took any of these books from the Reception Room under the impression that they were intended for the public, he is requested to return them to Mr. Thomas W. Cutler, hon. secretary of Exhibition of Drawings Committee, Reception Room.

SPECIAL INDIAN MEETING.

A SPECIAL meeting for the consideration of questions relating to Hygiene and Demography in India, took place yesterday afternoon, in the Theatre of London University. Burlington Gardens. The chair was taken at three o'clock by the Right Hon. Sir MOUNTSTUART ELPHINSTONE GRANT DUFF, G.C.S.I., C.I.E., late Governor of Madras.

A paper was read by Sir W. MOORE on "Sanitary Progress in India," followed by a paper on "Progress of Sanitation and Preventive Medicine in Rajpootana," by Surgeon-Major T. HOLBEIN HENDLEY, C.I.E., Residency-Surgeon Jeypore, Delegate for Rajpootana.

In the discussion on the two papers which followed,

Dr. PRINGLE said: Some conception of the magnitude of the sanitary problems in India might be gathered from the fact that in the last census the population was returned at 280 millions, and all who have had experience in India know that from various causes this is probably an under-estimate. In Dr. Pringle's experience as a public vaccinator was that at first the idea was prevalent that the English were searching for the black child with white blood, who was to rule the world, and as a consequence terminate the English rule. In consequence of this idea only girls were brought forward for vaccination. After a time, when it became marked that the lives of the girls had been saved, the custom changed, and only boys were brought forward, the girls being allowed to perish. It was impossible to form a true opinion of the death-rate in India. From the returns made in some places, it would almost seem that there was immortality. So few were the deaths returned, it was stated that the birth-rate was 30 per 1,000, but from a personal investigation, he should say that it was nearer 60 per 1,000. When they discussed sanitation in cities, they should remember that cities only represented 5 per cent. of the inhabitants of India, the remaining 95 per cent. living in villages. In the opinion of the speaker, improvement in sanitation must begin with the water supply, and if we were to pay more attention to this, the gain would be great. The village tank is a mere cesspool. Although it is stated that leprosy is not increasing in India, my opinion is that it has increased. The women now are not killed as they were, a nation holding it no disgrace to push a woman over a precipice, believing that falling into the water, which ultimately made its way to the Ganges by the purifying influence of the sacred river she was passed straight to heaven. Not only do I hold the opinion that leprosy has increased, but I also fear that those women now saved and protected by the action of the Government will probably be a source of danger, and cause difficulty in the future. Malaria fever is the sickness of India, and is of far more importance than cholera or any other disease. No idea can be formed of the number of deaths from malaria. In one part of the country the making of a high-level canal has transformed the district into a pest-house, and has been anything but an improvement. It has been stated by Sir W. Moore that opium is a prophylactic against malaria. All I can say is that speaking from a large experience I have never known it used by the natives as a prophylactic. One of the great difficulties in the advance of sanitation was the power of the customs of the country. A native cared no more than a cow what water he drank. Of all improvements in connection with India the greatest was the advance in moral sanitation of the British soldier. He had been taught by influences which were steadily working for his benefit, that he had a life to care for; and temptations to drink, which for him was a greater evil than malaria, was combated successfully by temperance agencies and the formation of harbours of refuge.

Mr. OLLIPHANT, C.S. delegate from Bombay, said that it had been his lot for nine years to be the head of the executive in Bombay. In India we had to think of two extremes. On the one hand the large cities, and on the other the rural villages In the cities there was great progress, while in the villages the simple Mosaic dispensation seemed the best that could be provided. During nine years' work in Bombay, we took advantage of the experience of advanced English towns, and followed their example in adopting the latest inventions in sewerage and water supply. As an instance, Bombay was the first city, after Liverpool, to adopt their system of preventing waste of water, and we are now just concluding large waterworks, which, with those already in use, will give 30 gallons per head of pure water to the whole population. In connection with these works there is a large lake 40 miles from Bombay, which has the largest masonry dam in the world. Speaking generally, good example and personal influence will do most to advance the cause of sanitation in India. We cannot force these reforms, as it were, at the point of the bayonet; we must proceed with tact and caution, and there is perhaps as much to fear to the cause from faddism and over-officialism as anything else. Along with the introduction of a water supply, all are agreed there must be a system of drainage, or malarial fever is certain to increase. These great works cannot be carried out without considering the question of finance, and here Bombay is at a great disadvantage. The people are anxious to improve their condition, but they need a helping hand. In vain they appeal to the Government to lend the money to guarantee the loan, or to allow them to raise the money in the cheapest market. It was only by the help of a friend that the Bombay Municipal Loan was floated; but the price now stands in the open market at 105. At present the statistics in India are not reliable. In Bombay I believe the death-rate is fairly accurate, but the birth-rate is certainly not so. In some villages the birth-rate is returned as much below the death-rate, yet they can be seen to be increasing and flourishing. Some advantage might be taken of the establishment of factories to improve birth registration by offering some advantage to the production of birth certificates in procuring engagement.

Notice.—An adjourned meeting will be held to-morrow (Friday), in the same room, at half-past two, to continue the discussion and hear other papers read.

THE LADIES' RECEPTION COMMITTEE.

During the meeting of the Congress a daily reception has been held for ladies whose husbands have been engaged in the more serious work of the sections. The receptions have taken place in Messrs. Agnew's Gallery in Old Bond Street, and have been of the greatest use to those ladies who have attended the Congress. Some members of the committee have always been present to receive visitors, and "personally conducted" parties have been taken to Buckingham Palace and to other places of interest. The committee consists of the following ladies:—

President—Mrs. Priestley.

Lady Wantage.
Lady Galton.
Lady Clark.
Lady Lister.
Lady Dalby.
Lady Roscoe.
Lady Fayrer.
Lady Saunders.
Mrs. Lauder Brunton.
Mrs. Arthur Lyell.
Mrs. Theodore Ackland.
Mrs. Rose.
Mrs. Frankland.
Mrs. Russell Reynolds.
Mrs. Douglas Powell.
Mrs. Malcolm Morris.
Mrs. Brudenell Carter.
Mrs. Everett Millais.
Miss Spencer Wells.
Mrs. Shirley Murphy.
Mrs. Ernest Hart.
Mrs. R. C. Priestley.
Miss Priestley.
Mrs. Moline.
Miss Hart.
Mrs. Theodore Williams.

Notice.—Excursion to Wolverhampton on Saturday.—The proper train for the members who are taking advantage of the invitation to visit Wolverhampton, starts from Euston 9.30 a m.

RECEPTION OF CONGRESS MEMBERS AT THE SANITARY INSTITUTE.

The Sanitary Institute reception of members of the International Congress of Hygiene was held yesterday afternoon at the Museum of the Institute, 74A, Margaret Street, W. A letter was read from the Duke of Northumberland (President of the Institute), regretting his inability to attend, and Sir Douglas Galton (Chairman of Council), having received the Queen's commands to attend at Osborne with the foreign delegates, was also unable to be present. The visitors were received by Sir Robert Rawlinson (Vice-President of the Institute). Among those present were: Sir Henry Thompson, Mr. Thomas Twining, Professor Giacinto Pacchiotti, Dr. L. Prochnik, and B. H. Thomson, and a number of other delegates from foreign countries and provincial towns. Sir Robert Rawlinson gave an address on the work of the institute and on the general progress of sanitation, referring particularly to his work in the Crimean War. A vote of thanks to Sir Robert Rawlinson was proposed by Mr. Rogers Field, and seconded by Mr. S. Cohen, of Hull. During the afternoon there were about five hundred people present, and the sanitary appliances were explained to the visitors by the members of the council. The museum has been lately re-arranged, and will be open every day to those members of the Congress who were unable to be present at the reception.

REVIEW.

A HANDBOOK FOR LONDON.

Messrs. Cassell and Co. have brought out a handbook for London for the use of members of the Congress. It is well printed and of a convenient size, and the contents are arranged in parallel columns of English and French. There is an exhaustive index, and some of the eight charts should be of service to our guests, especially those indicating the positions of places of interest in the City and in the immediate vicinity of Burlington House. The book contains a vast and varied amount of information upon all the subjects that could fairly come under the heading of "A Handbook to London," but the very comprehensiveness of the contents has made some of the articles comically scrappy. It is difficult to see who is likely to be benefited by the remarks upon the water and food supply of London, upon our sanitary legislation, or upon the London death-rate: Those who care for such things will want better information, and those who buy the book as an ordinary guide-book will feel that they have got what they did not expect. We must take leave to make a few further objections. The Tower of London was surely complete before the reign of Henry VIII. All the monstrosities of London are carefully enumerated, but the splendid statue to Sydney Herbert, which confronts the War Office (certainly one of the finest statues in the town), appears to have escaped notice. There can be no use in including in a theatre list the houses which are closed for the holiday recess. It is absolutely wrong, moreover, to speak of the Savoy Theatre now as the home of Gilbert and Sullivan's operas. Many pleasant places of excursion are indicated. The printer thoughtfully gives the expense of such trips, but he possibly underrates the financial resources of our distinguished guests, for he gives the third class fares only. Still the booklet is full of useful things, and must be considered cheap at a shilling.

Notice.—Members of the Congress wishing to visit Aldershot Camp to see the depot of the Medical Staff Corps and the Cambridge Hospital and Barracks, are informed that on Tuesday, August 18th, the train starts from Waterloo (main line) at 10.15 a.m. Tickets must be taken to Aldershot Town Station. The visitors will be received and conducted by members of the medical staff.

PUBLIC HEALTH,
THE OFFICIAL ORGAN of the CONGRESS of HYGIENE and DEMOGRAPHY, 1891,
AND
The Journal of the Society of Medical Officers of Health.

"PUBLIC HEALTH" SPECIAL DAILY NUMBERS.—It has been decided to re-issue these Numbers, revised and corrected, with Complete Index, in volume form, bound in cloth, price 3s. 6d. (postage extra for the United Kingdom, France, Germany, Belgium, Italy, United States, Egypt, 6d.; India, China, Brazil, 9d.; Australia, New Zealand, 1s. 6d. Postal Orders to be sent to Dr. Lovett, Hon. Treasurer, Society of Medical Officers of Health, 13, Great Russell Street, London, W.C.

SEVENTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

THE work of the Congress was practically concluded yesterday. To-day is to be devoted entirely to excursions. On Monday the closing meeting takes place.

DIVISION I.—HYGIENE.

SECTION I.—PREVENTIVE MEDICINE.

THE Section this morning were occupied in listening to a paper contributed by Surgeon-General BOSTOCK, C.B., and Sir VINCENT K. BARRINGTON, entitled:—

THE HOSPITAL AND AMBULANCE ORGANISATION OF THE METROPOLITAN ASYLUMS BOARD FOR THE REMOVAL AND ISOLATION OF INFECTIOUS DISEASE.

The paper was illustrated by models, diagrams, and charts, and was listened to with much interest.

The rapid removal and isolation of cases of infectious disease in populous cities plays so important a part in "preventive medicine" that an account of the work done in this direction by the Metropolitan Asylums Board was an appropriate and interesting subject for the consideration of the Congress. Prior to the year 1867 organised provision for the removal and isolation of infectious disease in the metropolis can hardly be said to have existed, at least as a means of prevention. It was the duty of the boards of guardians and the local sanitary authorities to provide accommodaton for infectious cases, but there was no central authority to organise the work. The London Fever Hospital, at Islington, and the Small-pox Hospital, at Highgate, were the only hospitals specially devoted to the reception of these cases in the metropolis. Both these are private institutions, and there was no hospital set apart for the reception and treatment of the pauper class.

The evils attending this unsatisfactory state are obvious, and the Poor Law Board obtained, by the Metropolitan Poor Act of 1867, power to combine into districts the parishes and unions of the metropolis for the purpose of providing "asylums for the reception and relief of the sick poor," and, in further pursuance of the power thus conferred upon them, the Poor Law Board issued an order combining the parishes and unions into one district, called the "Metropolitan Asylums District," for "the reception and relief of poor persons infected with or suffering from fever or the disease of small-pox, or who may be insane." On page 8, *et seq.*, of the special issue of this journal will be found an account of the work done by the Metropolitan Asylums Board, by Mr. Duncombe Mann, Barrister-at-Law and Clerk to the Board.

The Section broke up after the customary votes of thanks.

The following paper on

THE IMPROVED HYGIENIC CONDITION OF MATERNITY HOSPITALS,

By W. O. PRIESTLEY, M.D., LL D.,

was delivered yesterday afternoon, but want of space compelled us to hold it over until to-day's issue.

In the Life of Madame de Staël, it is stated that when Madame Necker first came to Paris, "the capital, priding itself on every refinement of luxury, sufferers in hospital were not even given separate beds, but as they arrived were added to the ranks, and indifferently shared a bed with those on the road to recovery and those who were dangerously ill." The period referred to was about 1770, and such a state of things has long since passed away in general hospitals as the result of enlightenment in hygienic arrangements.

Of the maternity hospitals we have no very accurate records for about the same period. The British Lying in Hospital was instituted in 1749, and the General Lying-in Hospital, in York Road, was founded in 1765. Statistics were, however, not then so accurately compiled as in later days but there is no reason to think the maternity hospitals were better managed than the general ones, nor the English better than the French.

If we look at the bills of mortality for the whole of London as far back as 1680, we find that for the 20 years ending at that date the average number of deaths in child birth in London was 1 in 44, and then as the result of greater care and better instruction in the obstetric art, the mortality gradually fell until for the 20 years ending 1820 the average mortality sank to 1 in 107.

Looking at such records as are in existence of the mortality in maternity hospitals in the British Isles and abroad, we see a great diversity of results, not only in different hospitals, but in the same hospitals at different periods. Thus, in the Dublin Hospital, the average mortality of parturition and its consequences from 1757 to 1832 was 1 in 93; in the maternity of Paris from 1799 to 1818 the mortality was 1 in 19. In the best year there, 1802, the mortality was only 1 in 115; in the worst year, 1819, it was as high as 1 in 8 women delivered. The statistics of the maternity hospitals in Vienna, Wurtemburg, and Prussia give approximately like results for about the same period; and to us who see in later days how these terrible accounts of deaths in mothers can, in a large measure, be prevented, the figures are truly appalling. Miss Nightingale also compiled very careful tables from various sources, illustrating not only the number of maternal deaths in child-birth in hospitals, but showing also the causes of death from various complications surrounding the puerperal state, and she has contrasted these with the mortality among women under like circumstances confined at their own homes. Taking Le Fort's data from various countries extending over a number of years, out of 888,312 deliveries she found the
were no fewer than 30,394 deaths, giving an a
death-rate of about 34 per 1,000. In contrast t
Registrar-General stated the average mortality in

at the time she wrote as only 5·1 per 1,000. Le Fort, indeed, computed the maternal mortality, when women were treated at their homes in this country and on the continent of Europe, at only 4·7 per 1,000. The late Dr. Matthews Duncan, it is true, took exception to both these statements and believed the maternal deaths in home practice were not far short of 8 per 1,000, or 1 in 125, and the Registrar-General, who at the time demurred to Dr. Duncan's estimate, eventually admitted that it was nearer the truth than the lower estimate of M. Le Fort. But taking the higher estimate of Dr. Duncan, the fact remained that the mortality to mothers was lamentably higher when they were confined in maternity hospitals instead of at their own homes. According to Le Fort it was nearly 7½ times higher; on the calculation of Dr. M. Duncan it was so considerably increased that it became essential to institute a searching inquiry into the causes of the greater danger accruing to the parturient woman when she entered a maternity hospital. This inquiry was taken up by a series of independent investigators, and it soon became abundantly clear that the larger mortality of lying-in hospitals, although to a small extent due to the more serious cases applying for admission to hospitals, was, in fact, chiefly produced by the disease called puerperal fever taking a diversity of forms which specially attached itself to these institutions and led to such disastrous results. No wonder that Miss Nightingale in her zeal for the welfare of poor patients should ask, "Unless it can be clearly shown that these enormous death rates can be abated, or that they are altogether inevitable, does not the whole evidence with regard to special lying-in hospitals but lead to one conclusion, viz., that they should be closed?"

Investigation proved that this dire scourge called puerperal fever originated in a variety of causes. In the first place it was shown that the mere aggregation of parturient women was, in the special condition of their bodies, a source of danger. Although parturition is a physiological and normal process, there is in lying-in women a special aptitude or proclivity to take febrile affections, and to develop them in intense forms. If, then, by chance fever gained entrance to the maternity hospital, it found a fertile soil for its rapid development, and spread the more readily from one patient to another because of their proximity. Thus, at least 75 per cent. of all the deaths in child-birth were found to be owing to puerperal fever.

The first important fact established was that it might be conveyed from patient to patient by medical men, midwives, and nurses.

The second fact elicited was that the disease could be carried from the post mortem-room and the dissecting-room by those who were conducting anatomical or pathological studies, and at the same time attending midwifery cases. This was clearly pointed out by Semmelweis in the maternity hospital at Vienna in 1846. Semmelweis encountered violent opposition in enunciating his views, as they were thought crotchety and likely to interfere with the training of students in midwifery. Time, however, has abundantly confirmed their accuracy. Sir James Simpson, in days when we knew nothing of the influence of bacteria in the production of disease, with the intuition of genius, called attention to the analogies between puerperal and surgical fever, and pointed out that there was a similarity both in the symptoms and morbid lesions, as well as in the anomatical condition of the patient. In both classes of patients there were open surfaces exposed through which a *materies morbi* might be absorbed, and he threw out the suggestion that the poison in each case might be similar or identical. An unhappy illustration of this view occurred at King's College Hospital, where the Nightingale Lying-in Ward was situated in a general hospital, and the patients were thus exposed to the influences surrounding medical and surgical patients. As the result of this proximity the mortality reached the appalling figure of one in thirteen, *and it was deemed right to close* the ward.

It was not until the discovery of the importance which micro organisms play in the production of disease that the full significance of these observations by previous investigators was understood.

A little more than thirty years ago M. Pasteur demonstrated that all fermentation is dependent on the growth of minute organisms. Schwann had previously discovered that alcoholic fermentation was due to the growth of minute cells which constitute the yeast plant, but we owe to the genius of Pasteur the full development and significance of this discovery. The investigations of Davaine, Rindfleisch, Waldeyer, Pasteur, Koch, and a host of observers established the fact that micro-organisms played a most important part in infective diseases of wounds, and also in various other diseases. Then followed the striking results of the antiseptic treatment, initiated by our illustrious countryman Sir Joseph Lister, founded on the recognition of the parasitic character of the infection which poisoned wounds and produced suppurative processes. These eventually opened the eyes of obstetricians as to the probable nature of puerperal fever, and the possible conveyance of a *materies morbi* from some external source to the body of the puerperal patient.

So far as I can make out, it was Professor Stadtfelt, of Copenhagen, who first applied the antiseptic method to puerperal uses in the Copenhagen Maternity Hospital. Here carbolic acid, believed to be a potent germicide, was employed, not only in the form of lotions, to the mucous and cutaneous surfaces of the patient, which were the obvious points of infection, but the hands of the medical man, midwife, and attendant, as well as every instrument employed, were sterilised by the same material. Later, M. Tarnier, in Paris, introduced bichloride of mercury or corrosive sublimate for the same purpose as being a more efficient germicide, and free from some of the objections attaching to carbolic acid. This is now extensively, I had almost said universally, adopted as the most trustworthy agent for the purpose required.

Eventually it came to be acknowledged that the poison of puerperal fever and its congeners did not originate under any circumstances in the body of a patient, that there was no such thing indeed as "auto infection," but that in all instances the infection must be imported to the patient from without. Guided, therefore, by the progress of antiseptic surgery, Winckel, Breisky, Schroeder, and Gusserow, in Germany, inaugurated a new departure, and began the practice of aseptic as distinguished from antiseptic midwifery, the principle of asepsis being to guard absolutely against the introduction of any poisonous matter from without, not to destroy it when already present.

Evidence in proof of the value of asepsis as distinguished from antisepsis is furnished by the results obtained in the maternity hospital at Helsingfors, in Finland. There the hospital is built upon a rock well above the level of the town and overlooking the Baltic. The purity of the atmosphere is promoted, therefore, by its natural situation. The foundations are dry and clean. The buildings are well-drained, and are constantly bathed by the sea-breezes. The Finlanders, moreover, are personally a very cleanly people. With these favourable conditions to start with, Professor Pippingsköld informed me that he did not find it necessary to disturb his patients by a slavish adherence to the minute antiseptic precautions practised elsewhere. In view, nevertheless, of the remarkable success which had been attained in other countries, he considered it necessary so to guard his patients, that no germs of disease could be imported from a foreign source, and consequently all doctors, nurses, and instruments were rendered entirely aseptic before coming in contact with the patients. At no time does the Helsingfors Maternity Hospital seem to have been decimated by puerperal fever as in other countries, yet under the new aseptic system there were good and instructive results. Not only has the mortality been lessened, but the mor-

or amount of illness incident to the puerperal state
een diminished. Thus, under the old régime, the
s from puerperal fever were not more than 1·26 per
Under the new, the mortality out of 3,841 de-
s were only 0·60 per cent·, and it was thus calcu-
that the lives of 22 mothers had been saved by the
tions of the later period.

mortality from puerperal fever in Helsingfors is
by the following figures: In the old hospital—1859
9, 7 per cent.; 1870 to 1871, 4 per cent.; 1872 to
1·11 per cent.; In the new hospital—1879 to 1883,
er cent.; 1884 to 1887, 0·29 per cent.

morbidity before antiseptic precautions were
ed was 12·10 per cent. Under the antiseptic régime
k to 4·11 per cent.

1885 I made a tour of some of the lying-in hospitals
rthern Europe, and saw the methods adopted to in-
mmunity from puerperal fever. In Copenhagen, the
so to speak of the antiseptic midwifery, the im-
ment in the salubrity of the maternity hospital was
arked, and kept pace progressively with the stricter
ptic precautions gradually developed and enforced
e administration. Previous to 1865 the mortality
puerperal fever in the Copenhagen maternity hos-
had been very high as elsewhere. During the
years from 1850 to 1864 it was as high as one in
y-four women delivered; the average mortality
he same cause being about one in 123 in the town
enhagen itself, exclusive of the hospital. Earlier
his the mortality had even been higher, for, from
atistics of Dr. C. J. Kayer, the deaths between 1822
343, with 21,149 deliveries, had actually amounted
h as one in nineteen. Immediately after the insti-
of the antiseptic system in 1865, the mortality from
eral fever began to decline. From 1865 to 1874 the
s were reduced to one in fifty-one of the deliveries,
a the last four of these years, viz., from 1870 to
the mortality was reduced to one in eighty-

ode of disinfecting nurses who have perchance been
ding a puerperal patient affected by illness in Copen-
, seemed to afford considerable amusement to those
eard the details, and were not themselves the sub-
f the experiment. The midwife, after her nursing
ver, was fumigated with sulphurous acid vapour.
was regarded as one of the most effectual methods of
al disinfection, but was not very popular among the
, as, however carefully arranged, it is scarcely pos-
o prevent the sulphur fumes from getting access to
eathing passages, and a quarter of an hour's deten-
a close chamber under these circumstances was not
led as an agreeable experience.

Russia, the antiseptic or aseptic methods have been
ed with remarkable success. The maternity hospi-
St. Petersburg, which is humanely supported by
rand Duchess Catherine, a cousin of the present
is one of the most carefully regulated in the world.
nder the personal supervision of Professor Balandin,
hen I visited it in 1876 I was much struck with the
eteness of the details for isolating the patients from
verse influences.

he result of this careful management, I learned that
the previous three years there had been only one
from puerperal fever in the whole establishment,
is was in the case of a woman who was brought ill
hospital, and died three days after the birth of her
There had been six deaths in the same period
navoidable causes other than infectious disorder.
orbidity, too, had steadily declined since the intro-
n of the antiseptic system. These results are the
remarkable as in the city of St. Petersburg itself,
e the hospital, both general and puerperal mortality
ry large.

same results obtain in the other maternity hos-
in Russia. Professor Slawiansky, at the Inter-
al Medical Congress in Berlin last year, gave the statistics of no less than 52 such institutions in Russia, and conclusively showed that just in proportion as antisepsis had been rigidly enforced, so had both puerperal illness and puerperal mortality declined.

The statistics of the lying-in hospitals of Vienna, Dresden, Paris, New York, and Boston, show a like improvement in the hygienic conditions since the introduction of an aseptic or antiseptic method. There is necessarily some variation probably arising from the difficulty of enforcing the same rigid precautions in some hospitals as compared with others, but even in the Paris maternities, the records of which seem somewhat less favourable than in Vienna, for example, the results of the new régime are very striking.

In the Imperial Lying in Hospital at Vienna the mortality from puerperal fever has declined from 13 to 4 per 1,000, and in Dresden from 8 7 to 0·7. In the New York and Boston Lying-in Hospital, between the years 1883 and 1885, the mortality from sepsis declined from 60.6 and 45·8 per 1,000 respectively to 1·8 and 6·4, while in 1886 in the latter hospital 373 deliveries were followed by but 3 deaths, none of which had a septic origin. In the Maternité at Paris the mortality per 1,000 was from 1838 to 1869 1 in 10½, from 1870 to 1881 1 in 43, and from 1882 to 1888 1 in 91.

Great Britain was slower than Continental countries to introduce the antiseptic method into its maternity hospitals, but the results have not been less satisfactory. Up to 1877 the General Lying-in Hospital in York Road was scarcely ever free from puerperal fever. Great anxiety was constantly occasioned by repeated outbreaks of the disease, and the institution had frequently to be closed for disinfection. Great expenses were incurred to improve the drainage and other sanitary conditions, but not until the introduction of antisepsis was anything like safety attained. The year 1879 was the turning point. Since then, as the result of the new method, and a larger knowledge of the precise details to ensure its efficiency, the total mortality—which from 1833 to 1860 averaged 30 8 per 1,000, and from 1861 to 1877, 17 per 1,000—has since fallen to 6 per 1,000, and puerperal fever has been so nearly abolished that there was only one death from it in three years. At the same time it has become an unusual event for a patient's temperature to rise during convalescence above 100°.

A like success has attended the introduction of a careful antiseptic method into other maternity hospitals in this country; and so much is it now relied upon, if efficiently carried out, that there is perhaps the danger of other sanitary conditions being regarded as of too little importance. There is at least this security, that by general acknowledgment, a thoroughly antiseptic plan is greatly facilitated by other sanitary arrangements, such as ventilation and efficient drainage.

Other factors have also played an important part in producing these good results, such as improvements in the construction of maternity hospitals, in the arrangements for drainage, ventilation, and water supply, and, lastly, and not least, the greater knowledge and intelligence exercised in nursing.

My friend, Mr. Bostock, consulted me, two or three years ago, concerning the erection of a lying-in hospital for his parish. As the result of his initiative a new lying-in infirmary has been built with the improvements which modern science has suggested. It is on the pavilion system, each of the two pavilions or wards containing ten beds, and these are widely separated from each other, the administrative block being situatrd between them and communicating by an open but covered corridor. When all the beds in one ward have been occupied, the ward is closely sealed and fumigated with sulphurous acid, while the other ward is utilised. The alternate system is the essential point in the administration, but besides this the aseptic or antiseptic method is carried out very completely. The medical superintendent, Mr. Percy Potter, says in his report that as the result of the last two years' experience, he has to accord unqualified praise so far as the effects upon the patients are concerned.

In concluding this paper, I would briefly call attention to a table in which I have thrown together the statistics of maternal deaths in six lying-in hospitals, situated in various countries, since the introduction of aseptic or antiseptic methods. With these I have contrasted the figures of M. Le Fort before the era of antiseptics, and Mr. Newbatt, the distinguished president of the Statistical Society, has kindly computed for me the difference in the proportion of deaths in the two cases.

It would be seen by the figures that while according to M. Le Fort, the maternal deaths in European lying-in hospitals were 34·21 per 1,000, under the old régime, the mortality is now reduced to somewhat less than five per 1,000. This computation, put in another way, indicates that if the former rate of mortality had been maintained 3,522 maternal deaths might have been expected; the actual deaths were only 511. In other words, 3,011 lives of mothers were saved as the result of new and purely scientific methods of treatment. This, I think, may fairly be stated to be one of the most striking triumphs of preventive medicine. It is no mean achievement to rescue from death more than 3,000 lives of women in the acme of their maturity, and when their lives are most valuable to their families. It may furnish an instructive study to some opponents of scientific research, who have not hesitated to charge those engaged in experimental investigations with a desire to gratify their own personal ambitions, rather than to promote the welfare of the community at large. (Applause.)

SECTION II.—BACTERIOLOGY.

The President took the chair at 10.15 a.m., and in opening the proceedings wished to correct a statement which he made with regard to the insusceptibility of pigs to tubercle. This is, he believed, a mistake, as in some countries tubercle in pigs is well known; but the President was still glad to be able to say that mutton was always free from tubercle, so that there is absolute safety from this disease in its consumption.

As Dr. Behring was absent unavoidably, Dr. HUNTER gave a *resumé* of it in his paper in English. The subject was "Disinfection in the living body." The chief object of the paper was to show by facts the possibility of rendering harmless pathogenic germs in living bodies. So late as 1883 this was not thought to be possible, but Pasteur's work on rabies, and Koch's on tuberculosis, have shown this theory to be false, so that we are now passing into a new era, in which we must study the best method of killing pathogenic germs in the living body. Antiseptics act not only on the bacilli, but also on their chemical products, so that disinfection must be held to apply to these poisonous chemical products as well as to the bacilli themselves. The spleen of a mouse dead with anthrax was exposed to the blood of an animal "immune" to anthrax, and it was thus rendered innocuous. If a combination of corrosive sublimate and chloroborate of sodium was used, the action was very marked. He has made 100 experiments on 1,000 animals to show the action of this substance. The disinfecting power is only seen after subcutaneous injection close to the original inoculation; if injected at a distant point the animals die. The action of the substance is only effective if injected one to two minutes after the original inoculation. But the action is also partly general, producing general changes in the blood, which render it unsuitable to the growth of anthrax bacilli. Behring concludes that there is a great future before us in the discovery of these valuable combinations. Passing on to diphtheria, the chemical disinfectant which acts best is the terchloride of iron. Corrosive sublimate and zinc, as described by Lister, are also effective. After animals have acquired a certain degree of immunity, these chemical agents act in a different way. He then contrasted the different action of these agents and mentioned the immunity afforded by the serum of the blood, the former being local and the latter more general in action. The latter form, produced by inoculation of attenuated virus, was useful in tetanus even when the symptoms were far advanced. The results of these experiments show that not only the bacilli, but their chemical products are acted upon. In conclusion, he said that the secret force of the living cells plays in the theory of immunity an essential part in our struggle for health. It is without doubt, that the process is most marked in the living elements of the body. But if we should be asked whether we can influence the functions of living cells for curative purposes, the reply is a hesitating one. If in earlier times the action of mercury, iodine, and arsenic was supposed to have done good, it is probable these specific remedies acted rather on the causes and products of the disease than on living cells. Even in cases in which favourable influence has been exerted by proper food on infectious diseases, this has been rather produced by an exaltation of the resistant powers. Hitherto, we only know that direct stimulus on living organs, in order to incite into activity, has had rather the result of causing disease than of endowing them with a higher degree of resistance. Perhaps we may conclude that in the general treatment of infectious disease, we must recognise the principle which Sir J. Lister has applied in the local treatment of traumatic lesions with such great result. (Applause.) That is, to keep away or make innocuous the heterogeneous causes of disease, but to leave in quiet living cells and living tissues.

Dr. ROUX (of Paris) inclined more to the belief that immunity was conferred by the direct action of the cells on the bacilli than any chemical action. He then compared chemical and living action, characterising the former as incomprehensible. Criticising Dr. Behring's theories, he objected to the generalisation of this theory put forward by Dr. Behring, and thought it was far from being proved. M. Metschnikoff, whose ideas he was forwarding, had not had the large experimental experience that Dr. Behring had had, but still he was in a position to strongly disagree.

The PRESIDENT here remarked that he regarded phagocytes as one regards higher animals which are gifted with an intelligence and not only a chemical action: The phagocyte naturally exists where it can obtain nourishment, so we must not only look to chemical action, as there is a great difference between living and dead tissues.

Professor MAX GRUBER next read his paper on

THE METHODS OF TESTING DISINFECTANTS.

He began by saying that the name of Lister would always be looked up to as among the greatest in this science, which called forth quite a demonstration among the French and German savants present, many of them standing and applauding roundly. He then read a paper, of which the following is a short abstract:—

From researches carried out in the Hygienic Institute, Vienna, during the years 1889 and 1890, partly by Dr. Nendörfer, partly by Dr. Yamané, of Tokio, Professor Gruber concludes that most of the methods hitherto employed to test the value of disinfectants are so defective that the results obtained with them are unreliable, sometimes altogether worthless. He entirely agrees with the views expressed by Geppert in this relation. The causes of these fallacious results are the following:—(1.) The extraordinary differences in the power of resistance of the vegetable growths of one and the same species of bacteria when grown in different media have been not sufficiently kept in mind. (2.) The organisms after exposure to the action of the disinfectants have not been placed under favourable conditions for growth, *e.g.*, cultivated on nutrient gelatin at the ordinary temperature, etc. (3.) The disinfectants have not been removed from the cultures, and the delay in their growth has been mistaken for their death, inasmuch as:—(4.) The observations have not been carried on sufficiently long. (5.) Sufficient attention has not been paid to the temperature as well as to—(6.) The medium in which organisms best thrive. (7.) The organisms have not been sufficiently distributed in the disinfectant. (8.) The preference given to experiments with silk threads on which the organisms have been allowed to dry, is, on several grounds, wrong, and has led to fallacious results. (9.) The method of testing the activity of a disinfectant by inoculating such threads into animals is also a very uncertain and imperfect one. He went on to show that when tested by proper methods, such as he describes, the disinfectant powers of most substances proves to be considerably less than has usually been conceived. The best agents have proved in his experience to be carbolic acid, lysol, and a preparation of kresole which he has recently had prepared.

Professor Hueppe then read a paper on

Kresole as a Disinfectant.

He spoke of the errors of observation generally made in these experiments, and went on to describe the preparation of his kresole disinfectant, showing specimens of the ingredients and their appearance when mixed. He finds a mixture of soluble tar products with sodium salicylate and water makes a serviceable solution, which is very effective in its action.

Dr. Armand Ruffer then read the following paper:—

Some Experiments on the Mechanism of Natural and Artificial Immunity.

The experiments were chiefly made with the bacillus Chauvoei (Charbon symptomatique. Rausch-brand. Quarter-Evil). The following points were established:—

A. The natural immunity of rabbits is not due to the absence of nourishing material. The same may be said of the immunity produced artificially in guinea-pigs, and of the increased immunity shown by rabbits which have been inoculated repeatedly with most virulent bacilli.

B. The dead serum of non-immune animals has greater bactericidal (?) powers on the bacillus chauvoei than the serum of immune animals, a paradoxical result. The living fluids of non-immune, naturally immune, and artificially immune animals have no power of destroying the same. By allowing an extremely weak virus to grow in the living fluids of a naturally or artificially immune animal, and protecting it from the action of wandering cells, the virus becomes so intensified that when reinoculated into the same or any other immune animal, it proves fatal to these animals. The living fluids of a febrile animal have no bactericidal powers for the micro-organisms which produce the fever. The virus which, protected from the action of wandering cells, has lived for three, five, seven, or more days in the living fluids of febrile animals becomes extremely intensified.

C. The inflammatory reaction, or rather the emigration of wandering cells to the point of inoculation is inversely proportional to the number of micro-organisms introduced. The number of micro-organisms which penetrates from the point of inoculation into the tissues and general circulation is inversely proportional to the number of wandering cells which have emigrated to the points of inoculation. Confirmatory evidence goes to show that the leucocytes are attracted to the point of inoculation by a chemical poison, and to prove that leucocytes absorb bacilli whilst the latter are still alive.

Dr. Ruffer detailed experiments to show that in acute infectious diseases the leucocytes do not emigrate, and to prove that the absence of inflammatory reaction is not solely due to: (*a*) paralysis of leucocytes, or to (*b*) vascular alterations, but to other and more complex causes. Experiments show also that though leucocytes refuse to emigrate, they may be exceedingly active, and that whenever leucocytes are prevented from reaching the virus, either through mechanical or other means, the disease ends fatally in naturally or artificially immune animals.

Dr. Ruffer also showed that iodine in certain strengths had an attraction for leucocytes, while lactic acid had a repellant action. If quarterd-evil was injected with lactic acid there was a very marked effect, while there was no effect with iodine. Benzol had a repellant effect. Every antiseptic must be studied inside as well as outside the body.

Dr. Buchner gave some experimental results on a substance having the formula Hg. O. Hg. (Cn.)$_2$ which were very favourable to its use.

Dr. Glubner replied shortly.

Dr. Roux read a paper on "The Practical Value of Preventive Inoculation," during which he frequently mentioned M. Pasteur's experiments. The age of the animal has an effect on the preventive inoculation. He then compared chemical preventive inoculation with that afforded by attenuated virus, the latter is more lasting, and altogether more effective.

Professor Babes, of Bucharest, then read a paper upon "Rabies and its Treatment." He said that to diagnose rabies it would be necessary to make a microscopic examination of the cord and medulla, and seek for certain lesions described by him in Virchow's Archives—swelling of certain peripheral fibres in the cord, and nodules of inflammation by the side of the central canal, and in the anterior horns. He then went on to enumerate the various methods by which inoculation could be practically performed, and laid down the following points to be considered with regard to the chances of success: (1.) The method employed. (2.) The time that has elapsed between the bite and the inoculation. (3.) The situation of the bite. (4.) The nature of animal giving it. Concerning these he laid down that: (1) Pasteur's, with certain modifications, is the best method. As long ago as 1886 M. Babes had pointed out the necessity for the passage from weak to strong injections being regular. (2) For the treatment to be efficient, the patient must be inoculated as soon after infection as possible, most of the deaths having occurred where mania developed unusually soon. (3) Bites in the neighbourhood of and involving nerves have been shown to be most fatal, hence the depth of the wound as well as its situation is of importance. (4) As a consequence, the fiercer the animal and the longer its teeth the greater are the chances of fatal result. The incubation, also, is shorter with such animals as wolves. Professor Babes concluded by quoting cases in proof of the efficacy of the treatment adopted in Roumania.

Professor Höyges (Budapest) then read a paper on "The Practical Results of Antirabic Inoculation."

Professor Arloing (Lyons) followed with a paper on "The Etiology of Typhoid Fever and the Relation of Eberth's Bacillus to the Bacillus Coli Communis." He also compared Roux's bacillus.

Professor Fodor then gave an account of an epidemic of typhoid which occurred in his district in 1890. It broke out suddenly, and in two weeks 700 cases appeared, many of them among the upper classes. Then it decreased, and there were only scattered cases for two months and a half, followed by another intense outbreak of 300 new cases. It then definitely ceased. The town lies on the slope of a mountain 2,000 feet high, and obtains its water from springs on the slopes. The water supply was examined throughout the two epidemics, and towards the end of the second, after several hundred inoculations had been made, five pure cultivations of typhoid bacilli were obtained. These were sent to Loeffler, who agreed that they were typhoid bacillus. The cause of the epidemic was found to be that leaky closets belonging to the laundry of the hospital flowed directly into the water supply pipe of the town. He does not think epidemics are generally thus caused, but more often by wet, unhealthy soil, and bad food and water, which debilitate the body, and render it susceptible to typhoid.

Professor HUEPPE asked a question concerning the presence or absence of flagella to the bacillus, as he found them sometimes with and sometimes without them.

Professor FRANKLAND then read the following paper on

THE BACTERIA EXAMINATION OF DRINKING WATER.

The author points out the enormous boon which Koch's method of plate cultivation has been to the accurate study of micro-organisms. One of its principal sanitary applications has been to the examination of drinking water, which has received very wide attention. As to the value of such an examination there are great differences of opinion even still, although the method has now been in use for upwards of seven years. At first it was supposed that the number of colonies obtained from a given volume of water would at once throw light upon its purity, and certain arbitrary standards were hastily set up after the most limited experience. These standards were soon found to be quite impracticable, and to lead to the most contradictory and irrational judgments. In fact the reliability of the method, excepting for special purposes, was entirely destroyed by the investigations of Leoni, Wolffhügel, Meade Bolton, as well as by those of the author on the multiplication of microbes in water. The author, indeed, already in 1885 showed the enormous power of multiplication possessed by some bacteria even in distilled water, and he has in consequence invariably insisted upon the limitation of a quantitive bacteriological method to the solution of problems concerning the purification of water by filtration precipitation, and other processes in which the water can be submitted to examination immediately after treatment. Applied in this manner, the quantitative method has yielded the most important information as to the removal of microbes from water by processes of purification both natural and artificial, and as to how such processes may be rendered more efficient. After touching upon some of his own experiments, more especially in connexion with the London and other water supplies, the author proceeds to discuss the question of the detection of pathogenic organisms in drinking water. Whilst duly appreciating the value of any positive results in this direction, he points out the valuelessness of negative ones, and urges that the search for pathogenic forms has only any sort of meaning whatever after an outbreak of zymotic disease, such as cholera or typhoid; whilst in almost all cases waters are submitted for examination in respect to their general and not to their momentary safety.

M. ARLOING then answered Professor Hueppe's question in regard to typhoid bacilli, saying the two kinds were probably intermediate forms.

Sir H. ACLAND referred to the new Bacteriological Laboratory in Oxford, where, for the first year, they were going to do nothing but examine water, to test the efficacy of bacteriological examination.

Dr. McWEENEY read the following paper:—

THE BACTERIOLOGICAL EXAMINATION OF DRINKING WATER, WITH SPECIAL REFERENCE TO THE DUBLIN SUPPLY.

The author insisted on the importance of such examinations, which should be made periodically, and, if possible, by the same person. The species occurring under ordinary circumstances once thoroughly studied, it is easy to recognise new, perhaps pathogenic, organisms occurring in time of epidemic. He then detailed the methods of establishing presence of pathogenic microbes in water, and the effect of filtration on the number of germs, and influence exercised by length of time the filter has been in use, also the effect of filtration in removing substances capable of sustaining bacterial life, and the difference as regards the number of living germs between filtered and unfiltered reservoir water, after lying for three weeks in sterilised plugged vessels. Illustrative facts on these points were also given, derived from an examination of the Dublin reservoirs. Then followed a short account of species hitherto isolated from Dublin water supply, and comparison with those described by Zimmermann, Lustig, and others, and demonstration of pure cultivations. The amount of work which still remains to be done in this direction, and recapitulation of results to be hoped for, were also spoken of.

Professor PROCHNIK (Vienna) gave a bacteriological study of the Berkefeld water filter, with a very favourable result.

Dr. VAUGHAN (Michigan) described his method of water examination, making plate cultures from it, and inoculating animals from a broth culture from it; from the animal if it died he made cultures, and compared them with those on the plates. He often found bacilli very like Eberth's but staining easily; he thinks these are involution forms of the genuine typhoid bacillus. He does not think any man's work should be accepted as truth, as he recognises a personal equation in everyone which may naturally mislead an individual; proof must be forthcoming from other sources.

Professor HUEPPE then gave a short address, in which he lauded the President's very valuable discoveries.

The PRESIDENT replied in a few words, thanking all present for their kind reception.

SECTION III.—RELATION OF DISEASES OF ANIMALS TO THOSE OF MEN.

THE INSPECTION OF MEAT WITH REGARD TO THE PREVENTION OF DISEASE.

The first paper on this subject was read on Wednesday by FRANCIS VACHER, M.R.C.S., Medical Officer of Health for Birkenhead.

Modern research has forced on the attention of the medical profession that there is no line of separation marking off the diseases of animals from those of man. A truth so obvious should have been clearly recognised long since; but, that while the conditions of health and causes of disease in man have been studied by physicians and medical officers of health, the conditions of health and causes of disease in the lower animals have been studied by veterinarians. Both studies are closely related branches of the same subject, and can be most profitably pursued together. The diseases of animals used for food and their relation to the diseases of man can nowhere be so well studied as in the public abattoir. Unfortunately in this country public abattoirs are not generally provided, and in those that exist the bulk of the interesting pathological material presented is wasted; because we have as a nation no properly organised system of meat inspection. Split carcases, dressed and cold, are viewed and passed without the viscera or any part thereof being produced, and their fitness for food is commonly decided by a nuisance inspector or market constable. The only slaughter-houses in many large urban districts are private ones, behind shops; and in these efficient inspection is impossible. There is little or no check on diseased or dead animals being dressed in rural districts and brought into towns uninspected; and even when a carcase infected with disease is seized, it has to be taken before a justice, and if he refuses to order its destruction it must be returned to the owner, and is of course sold as wholesome meat.

The necessary reforms will not be easily effected, but nothing less will accomplish the object sought. They are as follows: I. The general provision of public abattoirs. II. Closing of private slaughter-houses.

Licensing and registering of all butchers and their premises. IV. Appointment of competent inspectors of meat. V. General systematic inspection of animals and meat intended for food. VI. Appointment of competent assessors to sit with magistrates, and assist them when necessary in the hearing of cases relating to diseased meat.

Professor WALLEY said: I congratulate Dr. Vacher on avoiding controversial matter on the question of what diseases should disqualify flesh. I should have been glad if he had given us more information. I should, in dealing with the question of diseased meat, advise the constitution of medico-veterinary boards; the two professions ought to go together. With respect to what Dr. Fleming has said about veterinary surgeons qualifying for higher degree, I know no degree higher than the present one. The present generation of veterinary surgeons know much more about the subject than their predecessors. If they don't it is their own fault.

Dr. ADAMS (Maidstone) said a point he wished to mention was the great difficulty experienced in preventing the introduction of diseased meat from the country into towns. When the meat is dressed, and we do not see the viscera, it is difficult to detect disease. Some provision should be made for dealing with such cases.

Professor BROWN (London) said there had been failure on the part of veterinary colleges to provide for the study of comparative pathology in abbatoirs. The Royal College of Surgeons were now making an effort, but there was the difficulty of numbers. With 300 students it was difficult to avoid exciting the opposition of those who rent the abbatoirs. Dr. Brown advocated the construction of public abbatoirs, but there was great opposition on the part of the butchers, who were in favour of private slaughter-houses. Registration would be a step in the right direction, and should present no difficulty. In licensing, speaking from experience, he would expect greater difficulty.

Professor McFADYEAN said: I agree in the main with Dr. Vacher, but I do not think he has availed himself of all the means open for information. In Germany they have an admirable system which differs from that proposed by Dr. Vacher, and is simpler. On the question of skilled veterinary surgeons acting as meat inspectors, the fact is neither veterinary surgeons nor medical men are properly qualified for that post, but the essential preliminary training is that of the veterinary surgeon, and afterwards there should be a special course of training for meat inspectors. The methods in this country of providing slaughter-houses are far behind the age, and inspection of the places themselves only excites disgust.

The section, under the presidency of Sir NIGEL KINGSCOTE, opened at 10·15 yesterday with a paper on "The Infectious Diseases of Animals Communicable from Animals to Man, or vice versâ, by Professor PENONATZ, Turin, followed by Professor CROOKSHANK's paper on

ACTINOMYCOSIS.

In the course of the delivery of the paper the author passed round specimens illustrating the difficulty of distinguishing between cases of actinomycosis and tuberculosis. There was also shown a large number of morbid specimens, illustrating the appearances found in various organs affected with actinomycosis. Photographs were also thrown on the screen taken from cattle at a farm in Norfolk, where there was an outbreak of this disease. The photographs showed tumours and ulcerations on various part of the animal as the head, neck, flanks, organs of reproduction, etc. At the conclusion of his paper, Professor Crookshank drew attention to the fact that Dr. Ponfick, so well-known in connection with researches in this disease, was present in the room.

Professor CROOKSHANK said:—

I was invited by the Council of this Section to open a discussion "on diseases communicable from animals to man and *vice versa*," omitting any diseases which might be selected as separate subjects for discussion. Under these circumstances I thought it would be more satisfactory to deal exclusively with a disease common to man and cattle which has interested me for some years more than any other. I refer to human and bovine actinomycosis.

NOT A NEW DISEASE.

Actinomycosis has been frequently referred to as a new disease. Even so recently as in December, 1889, Professor Byron, director of the Bacteriological Laboratory of New York, in describing a case in man that came under his observation, spoke of it as a new infectious disease. It is not, however, thus correctly described, for the various manifestations of it have been met with for more than half-a-century, though misunderstood and misnamed.

From contemporary literature there can be no doubt that actinomycosis was very prevalent in Scotland in 1827-1839, and veterinary surgeons have long been familiar with certain morbid conditions in cattle known as wens, clyers or crewels, sitfasts, scrofulosus, tubercular or strumous abscesses, polypus or lymphoma or simply tumour of the throat, cancer of the tongue, scirrhous tongue, indurated tongue, ulcerated tongue, cancer of the jaw, bone-tubercle, osteo-sarcoma, fibro-plastic degeneration, spina-ventosa and carcinoma. But it is only comparatively recently that owing principally to the work of Italian and German pathologists, it has been found that these terms have been misapplied to the new growth associated with a highly characteristic vegetable micro-parasite, the ray-fungus or actinomyces.

PREVALENCE IN ENGLAND.

Six years ago, after studying actinomycosis in the pathological laboratory of Professor Johne of Dresden—well known for his own researches on this subject—I began to collect on my return to England all the information and material I could obtain of both human and bovine cases in this country. I found that the disease was not generally recognised as a common affection in cattle, in spite of the interest excited by the work of Dr. Fleming, to whom is due the great credit of first recognising a case in this country, and of bringing the work of the continental investigators prominently before the veterinary and medical professions. In 1887 I investigated a disease prevailing in Norfolk, and in the following year outbreaks which occurred in Essex, Hertfordshire, Cambridgeshire, and Middlesex. In the Norfolk outbreak I found on one farm 8 per cent. of the beasts affected with the so-called "wens" or "sitfasts," which I proved by microscopical examination to be cases of actinomycosis. These growths have been regarded from casual inspection as the result of strumous or scrofulous inflammation, but in all the specimens of wens which I have received from this country and the colonies, I have been able to demonstrate the presence of the ray-fungus.

A case of pulmonary actinomycosis with grape-like growths on the pleura convinced me that wens were not the only form of this disease which had been lost sight of under the designation of tuberculosis. In the morbid specimens to which I would draw your attention you will see appearances which have been invariably attributed in this country to tuberculosis, and will continue to be if we rely on a hasty examination in the slaughter-house.

ITS MANIFESTATIONS.

I shall now proceed to refer to the various manifestations of this disease, and to illustrate my remarks by morbid specimens from my own collection, and by photographs.

Taking first of all the digestive system, we find the disease attacking:—

(*a*) The lips, gums, buccal mucous membrane and palate, and appearing as nodules, wart-like growths or ulcers. The nodules and ulceration of the palate are well shown in a specimen sent to me for examination under suspicion of being the result of severe foot and mouth disease.

(*b*) The upper and lower jaw, where it probably originates in carious teeth, and extending and invading the neighbouring cavities and sinuses, destroys the tissues with which it comes in contact, expanding the bones into thin plates or reducing them to the appearance of pumice-stone.

(*c*) The tongue, where we see it most commonly in the form of nodules or wart-like patches under the mucous membrane, with a special tendency to ulcerate from the irritation of the teeth. These nodules may extend into the deep muscles, and often collect in rows more or less parallel to the superficial muscular fibres. Complete transverse sections of the tongue double stained readily show this arrangement even to the naked eye. Induration of the tongue results from secondary interstitial glossitis. I have seen, in one case only, a tumour embedded in the substance of the tongue about the size of a small tangerine orange, and more or less isolated from any surrounding growth.

(*d*) The pharynx, where the polypoid growths may be illustrated by a specimen from a most interesting case kept under observation for some time at the Royal Veterinary College. The animal died suddenly of asphyxia, and at the post mortem a tumour the size of a cricket ball was found, occluding the larynx.

Taking next the respiratory system, we may meet with the disease in :—

(*a*) The nasal cavities originating primarily there or resulting from extension of a growth from the lips or the pharynx, as in the specimen before you.

(*b*) The larynx and trachea generally in the form of polypoid growths, sessile or pedunculated, which arise primarily or occur secondarily by extension from the tissues in the neighbourhood.

(*c*) The lungs where the differentiation of the disease is most important, as the neoplasms in the lungs, especially in the early stages, and the nodular growths on the pleura are constantly mistaken for tuberculosis.

The disease is very rarely found in connection with the nervous system, but probably does not so rarely attack the reproductive system, although so far as I am aware only two cases have been described, one by myself and one by Professor McFadyean.

Fifthly, in the skin and subcutaneous tissues we find a favourite seat of this disease, producing the so-called wens or clyers so commonly seen in the fen country. A wen is first recognised as a small tumour the size of a marble or walnut, which increases in size sometimes with great rapidity and breaks down and discharges its muco-purulent contents through the inflamed and ulcerated skin; or it may go on increasing and form a large compact growth the size of a child's head. These growths when excised, hardened, and cut, have a characteristic honey-combed appearance produced by the interlacing bands of fibrous tissue which form a spongy structure from the interstices of which the fungus tufts and thick yellowish pus have for the most part dropped out. These appearances are seen in the morbid specimens and in complete sections of the tumours.

PREVALENCE IN AUSTRALIA.

In a report to the Legislative Assembly of New South Wales, Mr. Willous, Government Veterinarian, gave an account of an investigation made in conjunction with Mr. Park into the nature of a prevailing disease of the cattle in Tasmania. The disease occurred principally in the form of tumours of the upper and lower jaw, and from the detailed description, I have no doubt whatever that they were cases of actinomycosis and wrongly attributed to "scrofulous inflammation." At the Australasian Stock Conference, held in Melbourne 1889, my report on human and bovine actinomycosis published in the Annual Report of the Agricultural Department, 1888, was brought to the notice of the Board by Mr. Buchanan, Mr. Stanley, and Mr. Park, and from the coloured plates and photographs in the Report the nature of the disease known in Australia as cancer and lumpy jaw was at once recognised. Mr. Park moved for an inquiry, and while studying at my laboratory has informed me that this disease is very prevalent, but not yet recognised by the colonial veterinary surgeons as distinct from tuberculosis. Mr. Park brought over a tumour which he submitted to me for examination and report, and it proved to be an exceptionally interesting case of actinomycosis which I have referred to in a communication to the Bacteriological Section. (On the Morphology of Actinomyces.) Dr. MacLaurin, President of the Board of Health, who was also studying in my laboratory, on his return to Sydney demonstrated by microscopical examination the true nature of the cases mistaken for tuberculosis. In his report to the Legislative Assembly of New South Wales, June, 1890, Dr. MacLaurin states that the existence of the disease had not been recognised in Australia until he demonstrated the presence of the ray-fungus in a specimen belonging to Mr. Stanley.

PREVALENCE IN THE UNITED STATES.

Reports of the prevalence of actinomycosis in the United States have reached me through the courtesy of the Board of Live Stock Commissioners for the State of Illinois. In their report for 1890, several interesting communications have been published. Mr. Casewell, State Veterinarian, investigated an outbreak of the disease, known in America as "lumpy jaw," on a farm in Yates City, where there were 80 head of cattle, and 16 were found to be suffering from actinomycosis. And writing from Chicago, Illinois, Mr. Casewell reported that the disease was prevalent in nearly every county in that State, and that in his opinion it was spreading rapidly, and was "dangerously contagious." In December, 1889, Messrs. Casewell, Scott, Williams, and Page reported to the Board that they had examined certain beasts quarantined in the City of Peoria, 12 bullocks in charge of the Northern Distillery Company, 33 in charge of the G. W. Distillery Company, and 39 in charge of the Monarch Distillery Company, and all of them were affected with actinomycosis. In all 109 cases were slaughtered and condemned as unfit for food. Mr. Baker, reporting on four steers and one cow, in the Union Stock Yards in Chicago, found them suffering from actinomycosis in the form of large tumours in the head, neck, and throat, and small tumours the size of a large pea in the intestines. The meat was condemned as unfit for food.

As the result of these reports the Board enforces the destruction of all animals affected with actinomycosis, and prohibits the use of the carcases of such animals for human consumption.

At a Conference of the Inter-State Live Stock Sanitary Association, the following resolution was carried: "That it is the sense of this Conference that animals affected with this disease should be destroyed, and that the carcases thereof should not be used for human food."

THE DISEASE IN MAN.

As in cattle, so also in man, cases of actinomycosis have been met with, but not recognised as such. By the researches of Israel and Ponfick in Germany, and the recognition of a case in man by Acland in this country, a new field of inquiry was opened up. It was not a new disease in man, but it had not been differentiated from the diseases which it simulates.

The evidence on this point is absolutely conclusive, and it affords a striking example of the value of accurate drawings for illustrating researches on pathological subjects. In 1848, M. Louis met with a pulmonary affection supposed to be cancerous. M. Lebert discovered in the pus, and though unable to explain them, figured the tufts of club-shaped elements with which we are now so familiar. Nearly 200 cases have since been described in the human subject, and about 5 per cent. have occurred in this country.

Points for Discussion.

I would direct your attention to the following points as especially worthy of discussion. I referred to the manifestations of the disease liable to be attributed to tuberculosis, and would again draw attention to the morbid specimens and photographs. To what extent is this an explanation of the reports of a very high percentage of cases of tuberculosis in cattle, both in this country and the colonies.

With regard to the disease being dangerously contagious, I am of opinion that the disease is very rarely, if ever, the result of direct infection from cow to cow, or from cow to man. Two cases have been recorded in support of the theory of infection of man from the cow. Stelzner described a case in a man who had the care of animals, some of them having suppurating glands, and Hacker met with the disease in the tongue in a man who had charge of cows, one of them having had a tumour of the jaw. On the other hand, Moosbrugger found that out of 75 cases, 54 were in men and 21 in women and children. In 11 the occupation was not stated, in 33 their occupation did not bring them into contact with cattle. They were, for example, millers, glaziers, tailors, shop people, and students; 10 cases occurred among farmers, peasants, and farm labourers, and in one case only was there contact with diseased animals. Out of the 21 women and children, only four were peasants, and none had been in contact with diseased cattle.

I have so far found no evidence in this country to support the theory of direct infection from the cow, but I have succeeded in transplanting the disease from man to a calf (specimen L).

There is reason for supposing that man and animals derive the disease from a source in common, and there is a strong suspicion attached to cereals. In my opinion the Royal Commission now investigating tuberculosis should include the subject of actinomycosis, with special reference to the question of the possible transmission of the disease to man, and the action to be taken with regard to the flesh of the diseased animals, and I trust that evidence will be forthcoming on these points from the members attending the meeting of this section.

The **President** then called upon Dr. Ponfick to continue the discussion.

Dr. **Ponfick** said that he agreed with Professor Crookshanks in the remarks he had made. In cattle the disease was generally transmitted by the food of the animal, straw, grain, etc. He next mentioned the case of a boy who in drawing a straw through his mouth detached, and appeared to swallow a portion. Eight weeks later an abscess and swelling in the subscapular region developed, which, on being opened, discharged the piece of straw, this was followed by actinomycosis of lungs and pleura, and the boy died, the affection resembling tuberculosis; there was perforation of the œsophagus, and a fistulous opening. It is probable that in both man and animal the source is the same, and that it does not spread directly from man to animal or *vice versa*.

Professor **Nocard** said: I do not wish to speak in a magistral manner of the scientific question which Professor Crookshank has brought before us. I wish rather to dwell on the hygienic and sanitary side of the question. When one considers the geographical distribution of actinomycosis, one cannot fail to be struck by the irregularity of its course. A certain district is much affected; another entirely escapes. Bavaria, Scotland, Italy, and some of the Northern States of America have been much affected. At the veterinary hospital at Utrecht there are always cases of the disease. When I want recent specimens for my practical demonstrations, I have only to write to my college, Thomassen, and within a week I receive a "langue de bois" (wooden tongue), as they call it in Holland. In France actinomycosis is a rare disease, and one rarely sees it, except under the form of osteo sarcoma of the jaw, and although, for the last ten years, I have been on the look-out for it in specimens of tumours which have occurred in my practice, and in those sent me by old pupils, I have only seen three cases of active pulmonary actinomycosis and a single case of tumour of the jaw. With us the disease generally remains in an isolated form, and one never sees it transmitted to those in the neighbourhood of the sick. Yet these patients are for a long time—often for several years—in intimate association with other people. As long as the growth does not, by its size or by its destruction of the molar teeth, make mastication impossible, the sufferer remains strong, eats well, puts on flesh, works, and, in the case of a woman, produces as much milk as other women. The tumour will often soften to the point of ulceration, yielding a fluid rich in actinomycoses; the orifice then does not heal readily, but remains for a long time as a fistula, whence fungoid growths continue to spring. But, I repeat, in France we never see cases transmitted by contagion or infection. How then does the disease spread? Undoubtedly in certain food stuffs. Many accurate observations go to prove that in certain districts the pasture is infected with the germs of the parasite: this is shown by a recent outbreak, where a large number of wolves and cows were all attacked simultaneously with the different forms of the disease. In such a district as this man also can be infected if he eats green food uncooked. The question of man infecting animals, or animals infecting man, does not seem to me to arise. In some places a regular panic will prevail, under whose influence the infected beasts are tracked out, slaughtered, and the sale of their flesh for food prohibited. This is not only a wasteful proceeding, but a useless. The pasture still remains infected. In my opinion it is towards the biology of the parasite that the hygienist's efforts should be directed, that some rational and efficient method of prophylaxis might be arrived at. Actinomycosis is a wide spread disease. In discharge of my duties as chief inspector of the Moscow meat market I have seen over 2,000 infected animals in the last two years, and the result of this experience is that I conclude actinomycosis to be a non-malignant, non-infectious disease, localised in the body of the infected animal. Most of these cases have been diagnosed in an early stage. During the first year of my office my colleagues and I contented ourselves with macroscopic inspection, and as a result diagnosed only 200 cases, but we now use the microscope to all tumours and suspicious-looking abscesses. As a result we have found actinomycosis in the shape of little tumours about the size of an egg in the skin of the neck, and about the size of a pea in the mucous membrane of the mouth. It is my belief that the reason why the statistics collected from the slaughter-houses of many great towns show such a low record of actinomycosis among animals is because one neglects to look for the early and much the most frequent cases.

Dr. **Salmon** remarked that the statements in regard to the prevalence and contagiousness of actinomycosis in the United States had been greatly exaggerated, because of the financial interests involved, and the rivalry between state and city inspectors of animals and meats. Conclusions drawn from such statements are liable to be very far from the truth. The question of condemning the carcass of all animals affected with the disease is very important both to the consumers of meat and to the producers of bovine animals. If there is danger of infection to man the meat should not be allowed to go upon the market, and if there is no danger the consumer is entitled to know that the meat he is buying came from an animal affected with a serious disease. In the present condition of public opinion in the United States the utilisation of the carcases of animals affected even in the slightest degree would not be tolerated. Doubtless we have gone to extremes, for it is difficult to draw a definite line between cases so severe as to make condemnation necessary, and those which are as mild as not to injure the flesh in the least. So far from there being 4 or 5 per cent. of the bovine animals in the United States affected with actinomycosis, it is probable, from the results of the national inspection recently established, that there are not over one or two per thousand among the beef cattle which arrive at the stockyards. When it is stated that from ten to fifteen affected animals are sometimes discovered in the Chicago stockyards in one day, it should be remembered that from eight to ten thousand bovine animals may be received in those yards in a single day.

Mr. Goodall, Christchurch, said: I feel diffidence in addressing such a meeting of learned gentlemen from all parts. But in meetings of this kind each and all should add his quota to the stock of knowledge, which, weighed together, may assist us to arrive at the truth. We should speak with great reserve as to whether these diseases are or not contagious. But our present knowledge does not provide us with sufficient data to make us arrive at this conclusion. The diagnostic symptom is the yellow appearance of the nodules. It is never found without a lesion either in the skin or mucous membrane. In two specimens that I have in my possession I found a piece of the stem of heather tightly wedged between the two lower molar teeth. In both cases the molars were changing. It is a common thing to find lesions in the mouth at this period of life. In my cases the inflammation extended from this point into the alveolar cavities, and thence into the spongy structure of the jaw, and it might easily be imagined how such a body in such a position might scratch the tongue. Our present knowledge seems to prove that this is a fungus which finds its normal habitat in vegetable structures, and is only accidental in animals. In Dr. Fleming's work it is reported that disease has been induced by the introduction of the aspergillum glaucus into the system of animals. This might, therefore, be termed a contagious element. A conference like this should carry their deliberations to the utmost limits, and this should not rest with the diseases communicable from animals to man, but from the vegetable to the animal world. I may not have another opportunity of addressing the meeting, and I would beg to call attention to the part played by the larvæ of dipterous insects in the great economy of life from a hygienic point of view. There has been no mention made of these in any branch of the conference; the mouth of these larvae, which are reported to feed on decomposing organic matter, are so constructed that this is impossible; but doubtless they feed on the lowest forms of life; and the larvae of the dipterous and other insects, are the scavengers provided by an omniscient creator for keeping these lowest forms of life in check.

Professor Walley said that in attending meetings of this kind one always had one's ideas enlarged, and one always learned much of which he was previously ignorant; this is especially true with reference to actinomycosis cases, as until to-day he (Professor Walley) was not aware that internal lesions were commonly found in cattle. During the past few months the speaker had condemned 140 carcases out of a total of 803 cows slaughtered on account of pleuro-pneumonia owing to their being affected with tuberculosis, but in not one of these cases was there the slightest evidence of the existence of external lesions, and he thought that if any large proportion of cases of actinomycosis had existed in these cows there would have been some external localisation of the disease. It was not a matter of much importance whether the disease were actino-mycosis or tuberculosis, for if internal lesions exist the carcase ought to be destroyed. Professor Crookshank's remarks showed the necessity of dealing with actinomycosis as a contagious disease equally with tuberculosis. He failed to see how it could be held not to be contagious, even though the contagion might only be transmitted accidentally. If practitioners who met with cases investigated the surroundings, nature of the food, etc., much good would be done. In the speaker's opinion it was most common in poor districts, where the herbage is coarse. In connection with the use of the flesh, Professor Walley said he would not condemn a carcase where the lesion were localised in the tongue and skin. As Dr. Salmon remarked, if he or any other inspector condemned meat under such circumstances, other professional men would be brought forward by the butcher to give a contrary opinion. The sooner the better the disease, along with tuberculosis, should be scheduled as a contagious disease.

Mr. Barrett, veterinary inspector, London, said that the disease was most frequently found on heavy land. On light land it was almost unknown. As many as 2 per cent. of the animals from Canada were said to be affected with the disease. The disease seemed primarily to affect the alimentary tract, secondarily the lungs. The most common age is from 18 months to two years. The animals do not contract the disease from one another, but get it from the same source. The speaker did not think the mistake of confounding actinomycosis with tuberculosis should be made.

Professor McFadyean, while admitting that actinomycosis might have been confounded with other diseases, did not think such mistakes were very frequent or very important as far as veterinary surgeons were concerned. He had been much interested to hear that it had been confounded with tuberculosis in Australia, and this confusion was probably responsible for the statement as to the prevalence of tuberculosis among cattle that had never been housed. It would be interesting to learn whether the system of meat inspection in America was adequate to ensure that none of the dead meat exported to this country was derived from animals that were the subjects of tubercle or actinomycosis.

Sir Henry Simpson, M.R.C.S. (Windsor), said he lived in a district where the disease was not common, cases which do occur are imported. It does not appear that the disease is contagious, at least in a high degree, and he was quite content to recommend the consumption of the flesh of infected animals, always excluding the locally diseased parts.

Dr. Crookshank, in reply, said he fully endorsed what Dr. Salmon had said. Those subjects should be calmly and judiciously considered. In answer to some of the speakers, he wished to say that he had studied the cases clinically, as well as microscopically. As to the question of the disease being confounded with tuberculosis, there was no doubt the great fear which had arisen in consequence of the statement as to the prevalence of tuberculosis would be allayed, if it was found that the less serious disease, actinomycosis, had been confounded with it. His remarks applied more particularly to those cases of what had always been considered scrofulous, but which were cases of actinomycosis.

Papers were read on "Anthrax and its Relations to Workers in Various Trades." By Professor Chauveau, Paris. And on

ANTHRAX AND ITS RELATION TO WORKERS IN VARIOUS TRADES, ETC.

By W. Duguid, F.R.C.V.S.

The following is an abstract of Mr. Duguid's paper:—

The names by which the disease is known are anthrax, charbon, miltzbrand, etc. It is known over the whole surface of the globe, and has been described by travellers in all parts of the world. Anthrax has no doubt been known from the earliest times, and probably some of those devastating plagues spoken of in the early and middle ages as attacking animals and spreading to mankind were anthrax; but, owing to the want then of the exact methods of investigation we now possess it was often confused with other diseases. It was not until recent times when the microscope had been for some time used in the study of medicine that we were able with certainty to distinguish anthrax from other diseases. Until the rod-shaped micro-organism which is characteristic of anthrax was discovered, the appearance of the disease was attributed to many different causes according to the conditions under which different observers had opportunities of investigating outbreaks. This was the first disease in which a micro-organism was constantly found, and with the discovery of the bacillus of anthrax a new era began in the study of contagious or transmissible diseases. Anthrax is primarily a disease of animals, more particularly of ruminants. In all countries outbreaks of anthrax are most common, and usually begin among cattle and sheep, and are from them transmitted to other animals and man. While some kinds of animals are extremely susceptible to infection, there are others which possess an amount of infection-resisting power which approaches almost complete immunity. When few animals, cattle or sheep, die at intervals on a farm, it is seldom the source from which the infection came is satisfactorily made out; the weight of evidence is, however, in favour of the idea that it is usually by ingestion; the transmission to other animals and to man afterwards may take place in different ways, the chief of which are inoculation, ingestion, and inhalation. The different forms anthrax assumes, according to the mode of infection, in man are malignant pustule, intestinal anthrax, and wool-sorters' disease.

In the discussion which followed, the following speakers took part:—Dr. LODGE, Bradford; Dr. GEORGE FLEMING; Dr. HIME, Bradford; and Professor BROWN, London.

A paper was then read by FREDERICK SMITH, M.R.C.S., F.I.C., on

VETERINARY HYGIENE.

The scope of veterinary hygiene is extensive—the breeding, rearing, and management of animals, the fattening of cattle, and the training of horses. The laws of health in respect of water, air, ventilation, food, stables, drainage, and with horses, labour, saddles and harness, care of the feet, shoeing, etc., if attended to, induce health and vigour, and prolong life. The eradication and suppression of epizoötic diseases is the second branch of veterinary hygiene; its importance to the United Kingdom, which has to draw much of its supply of animal food from other countries, cannot be over-estimated, and its neglect has caused us the cattle plague with its enormous financial loss. The third branch of veterinary hygiene deals with the inspection of animals for meat and milk production. The final decision must always rest with the medical officer, who, in all cases, should be assisted by the veterinary expert. Lastly, the production of animal lymph for human vaccination. How far is the veterinary profession in this country prepared to accept these heavy responsibilities, and what is the nature of the training given to the student to admit of his becoming an expert? The hygienic training of the future veterinary profession is neglected, and support is asked for the following resolution: "Seeing the immense advantage to be derived from the application of veterinary hygiene, the Seventh International Congress of Hygiene and Demography respectfully urges the Royal College of Veterinary Surgeons to institute examinations in veterinary hygiene, and to have the subject taught in the schools." Veterinary and human hygiene overlap in many places, in food inspection more than in any other branch; hence the medical officer of health should have some insight into the pathology of those animals intended for food, and this subject should form part of the examination held at our universities for the diploma in public health. The value of veterinary hygiene to the State cannot be over estimated; its services have been demonstrated on a large scale in the army for many years past, by the absolute eradication of glanders, farcy, mange, canker of the foot, and specific ophthalmia, diseases which formerly prevailed in the horses of the army but which are now practically unknown.

After a few words in discussion of this paper by Mr. GOODALL (Christchurch), the PRESIDENT rose for the purpose of saying a few words in drawing the meetings of the Section to a close. He gave expression to the pleasure it had given him to preside over such a meeting, and proposed a comprehensive vote of thanks to all who had assisted in securing the success of that section of the Congress.

Professor CHAUVEAU (Paris) in proposing a vote of thanks to the president, said he was extremely happy to be able to return in time to propose, in his capacity as a foreign visitor to the Congress, a cordial vote of thanks to their worthy president. His assiduous attention and active interest in their debates, his charming personality, and the admirable manner in which he directed and distributed the precious time allotted to the numerous speakers, deserved their most sincere thanks. He offered his hearty congratulations to the president upon the success of the section over which he had so ably presided. (Loud cheers.)

After being briefly seconded by Dr. SALMON (Washington), this resolution was put to the meeting, and, amid enthusiasm, declared carried.

A vote of thanks to the secretaries of the section was then proposed by Dr. HIME, and seconded by Professor WALLEY.

After a few words of reply from Messrs. DUGUID and CLARKE, the meeting of the section came to a close.

SECTION IV.—INFANCY, CHILDHOOD, AND SCHOOL LIFE.

At the opening of the meeting, Dr. PASTEUR announced that the bed and other apparatus used yesterday to illustrate her paper by Frau Marianne Nigg had been presented by that lady to the North-Eastern Hospital for Children, and he was requested by that institution to thank her heartily for them.

Then the PRESIDENT called upon Dr. FLETCHER BEACH to read his paper on

THE CARE AND TREATMENT OF EPILEPTIC, MENTALLY FEEBLE, AND IMBECILE CHILDREN,

and asked Dr. Langdown Down, who had had great experience in such cases, to take the chair during the reading of this paper.

The following is an abstract: Three perfectly distinct classes of cases are here referred to, and the care and treatment of each should proceed on different lines. With respect to the first class, little has yet been accomplished. Some time ago the Charity Organisation Society suggested that workshops should be provided for them, where they might work during the day, returning home at night but the suggestion was not carried out. The author proposes that homes should be prepared for them, where they could be trained mentally and physically, and where medical treatment could be pursued. He objects to their being sent to day schools, because it will be impossible to supervise their diet and hours of sleep, to guard them against states of excitement in their own family, and to ensure that the medicine prescribed is given. The care and treatment of the feeble minded is a much larger question, and Committees of the Charity Organisation Society and British Medical Association have for some time been working at it. Official bodies have also had the question before them. It is interesting to know that the London School Board have decided to adopt measures for teaching the feeble-minded children under their control. Reference is made to the investigation of the child population of London in 1889 by a committee of the British Medical Association, and to a subsequent one just completed, in which 50,000 children have passed under observation. The author suggests that auxiliary schools, similar to those in Norway and Germany, should be established for feeble-minded children, in which instruction adapted to their powers of reception should be given by teachers experienced in the methods required to call out the faculties in such cases. If these children are not taught, the girls are apt, as they reach the age of maturity, to lead immoral lives, and, as well as the males, to swell the ranks of the criminal population. The measures to be adopted to remedy this evil are given. Passing to the care and treatment of imbecile children, the author remarks that the accommodation required for them is markedly deficient. Statistics are given which show that at present about 8,000 improvable idiots and imbeciles, who now pass their lives in workhouses, or in the wards of lunatic asylums, have to be provided for. Reference is made to the committee of the Charity Organisation Society, which considered the question some time ago, and suggested remedies for it, and to another committee which sat in 1877, and which endeavoured to obtain funds from the Charity Commissioners, but without avail. The author details the measures required for the further accommodation of this class, and concludes with a short sketch of the kind of training which is given in institutions for idiots and imbeciles.

The PRESIDENT then read Dr. Shuttleworth's paper, in the unavoidable absence of the last-named gentleman. In the course of this paper, which was entitled

THE CARE OF THE MENTALLY FEEBLE CHILD AS DISTINGUISHED FROM THE IMBECILE,

the author wrote that he understood the term "mentally feeble" to be applied to those children whose mental endowments were so peculiar or so poor as to render them unfit for the classes of ordinary schools, but still fit for useful home life. There were no special classes for the children of the poorer classes, and he had been for the last few years advocating the establishment of classes for such exceptional children, and he rejoiced to see that the London School Board were about to start such classes. As far as he was aware, this was the first attempt that had been made in this country to minister to the needs of the mentally feeble children of the poor, although arrangements have been made for several years in Norway, Germany, and some of the Swiss Cantons. From a report of a Royal Commission on "the Education of the Blind, Deaf, and Dumb," he informed them that in Christiana and in Bergen special classes are organised in connection with the public school system for the separate instruction of such pupils as are found incapable, in consequence of abnormal nervous conditions, of receiving benefit at the ordinary public schools. In Christiania there were three teachers having 28 pupils collectively, the majority of whom furnished examples of mental or nervous defects not amounting to idiocy. The methods used were those best adapted for such cases, viz., those to fix the attention, to quicken the perceptions, and to overcome excitability, by a specially adapted drill. This ratio of teachers to children (one to ten) allowed a fair amount of individual attention, and the manager gave a very favourable account of the success of these classes. The drawbacks to the more complete success are the short time the children spend daily under the care of their teachers, and the depressing influences of their homes in many cases. At Bergen, thirty-five children out of 5,000 attending the public elementary schools are at present in these auxiliary classes.

The classes are held in the afternoon only, and near the ordinary schools, so as to make them easily accessible to the children. The principle of the school at Brunswick is that the auxiliary schools are designed for such children as, after a trial of at least two years in the public elementary schools, have not proved competent for promotion, and so cannot keep on a level with the other children; but on the other hand, those children are excluded who, on account of too low mental capacity, too great bodily infirmity, or of insufficient home care, are better assigned to special institutions.

The cultivation of the senses and the training of the hand form important parts of the instruction.

It might be a question whether a boarding-house in the country would not be preferable to even the best specially adapted institution in a town. Considering how much of the education depends on the care bestowed on them out of school, as well as in school, he thought that the institution would be more useful than special classes.

He was sure that the forthcoming experiment of the London School Board of providing special instruction for those children who are unfit for ordinary schools will be one which will attract great attention, and he hoped it would be so successful as to attract universal imitation.

Dr. Ludwig Strumpell's paper was read, in his absence, by Dr. KOTELMANN.

Dr. LANGDON DOWNE said it was 25 years ago that he wrote to the Congress at Belper on this subject without effect; but he was glad to find that constant reiteration had brought the subject before the world. The most difficult part of the subject taken up by Dr. Fletcher Beach was the question of the treatment of epilepsy. The great difficulty is that they have fair intelligence, but are subject to epilepsy, and are liable to mischievous outbreaks. He was glad that the term "feeblemindedness" had been used. No mother would admit that her child was an idiot. The Americans had adopted the word some time ago, and he thought it would be well if we also adopted it. No mother would allow her child to go to an institution and associate with others, and the advice almost invariably given by the medical profession, "Don't allow your child to mix with others worse than itself," was bad, and was always taken by the mother in a much extended sense. There was one class of patient not yet mentioned by any of the speakers—the moral idiots, who are the most difficult of all to manage. They had moderate intellectual capacities, but vicious tendencies. He remembered the case of a boy, the son of a minister, who had engaged a substitute to come on a certain day. The day before, the boy telegraphed to the substitute not to come, and then he had the fun of seeing the congregation come to church and have to return without service. He (the boy) was expert on the organ, but would often stop short in the middle of a tune for a joke. He was sure great results would be obtained by the measures of the London School Board.

The following resolution was then proposed by Dr. KOTELMANN: "That this Congress do appoint a commission consisting of three persons severally conversant with mental diseases, education, and statistics, whose duty it shall be to inquire into mental feebleness in children; beginning with small districts, and continue and carry out the same according to a fixed plan. The Congress shall empower the commissioners to add to their number and to appeal to recognised authorities for assistance if necessary."

This was seconded by J. P. RICHARDS, Esq.

Dr. GUYE (Amsterdam) then read his essay on "Aprosexia and Headache in School Children."

Dr. EDWD. HOFFMANN contributed to the discussion as did also

Dr. J. S. ESCHERICH (of Graz).

Dr. WARNER proposed, as an amendment, to enlarge the scope of the resolution: "That this Congress do appoint a commission, consisting of persons severally conversant in (1) examination of the physical condition of children; (2) mental conditions and diseases; (3) education, and methods of dealing with children; (4) statistical compilation of facts; whose duty it should be to inquire into the condition of children in schools and elsewhere, and carry out the same upon a fixed plan. This Congress empowers the commission to add to their number, and to appeal to recognised authorities or sources for assistance if necessary."

This amendment was seconded by Dr. Fletcher Beach, and carried *nem. con.*, and the motion, as amended, was carried with one dissentient.

Dr. Wm. Hill wished to emphasise the remarks of Dr. Guye, who had treated the subject from the surgical point of view.

Dr. Campbell's (Principal of the Royal College for the Blind, Norwood) paper on "The Education of the Blind" was read for him by Mrs. Campbell, and received with applause.

At the conclusion of the paper,

Dr. Campbell proposed: "That the time has come when the blind should have a well graded, practical, and comprehensive course of instruction; that the training of the blind should not be conducted on a charitable basis, but formed on a national system of education." He asked the President to second it, when it would have a peculiar interest, because he (the President) was a leading light on educational matters.

The President said he hardly knew whether he was in order in seconding the resolution, but, if the members would allow him, he would have very great pleasure in seconding it. (Applause.)

Major-General Moberley then read his paper on "The Physical, Manual, and Technical Education of Deaf Mutes."

Then Dr. Gutzmann, of Berlin, read a paper on "The Hygiene of Speech in Children."

Then a paper by Dr. Kotelmann, on "The Acuteness of Vision in School Children."

Dr. Edward Gallaudet, President of the National Deaf-Mute College, Washington, said he had had a paper put into his hands outside containing the statement that "the oral method of teaching the deaf is applicable to all kinds of children, except those of defective vision and weak intellect." In America their large experience leads them to dissent from that view. They teach the oral system to its fullest extent to every deaf child they can; but there are many deaf children not weak-minded, but who yet lack a certain faculty, similar to that which enables some persons to learn music more readily than others, which prevents them from successfully learning it. With regard to the blind, he could not too heartily commend to their attention the remarks of his fellow-countryman, Dr. Campbell, who had come back from the States to teach even the English something—they were all Englishmen by descent, he would observe, on the other side—and he felt sure that his influence would extend all over this and every other country. He thought that there should be means of higher education for the deaf, so that they should be enabled to sit for the B A. and B.Sc. examinations in this country, as there was at Washington.

Dr. Bronner, of Bradford, then read his paper "On the Importance of Detecting and Treating Defects of Vision and Hearing in the Children of our Board Schools."

William Van Praagh, advocated the teaching of the deaf in the day schools, and not in depressing deaf-schools, and where their homes are not fit for them, board them out. Concerning Dr. Gutzmann's paper, there were many children with indistinct articulation at school. They should be collected into classes and taught to articulate distinctly.

Dr. Gladstone remarked that the case of the blind and of the deaf mutes had always drawn out human sympathy, and philanthropic persons have always desired to mitigate their difficulties, but have not always had the knowledge how to do it best. It did not follow that because a person was blind or deaf that his brain was not as well formed as that of another; such persons are just as capable of doing good work, and should have every opportunity of doing so. He could most heartily commend the work done by Dr. Campbell. (Hear, hear.) Parents and nursemaids should be more careful to teach the children to speak more correctly. There are three ways in which the deaf may be taught to speak, viz., (1) by the language of signs, (2) spelling on the fingers, (3) the oral method. There was one difficulty in the way of the last system, viz., the extremely unphonetic spelling of the English language. The children would learn to speak one way, and would have to write another way. The French language was almost as bad; but the German was considerably better.

Dr. Gutzmann made some remarks on General Moberley's paper.

Then the resolution of Dr. Campbell was put to the meeting, when

General Moberley moved that the words "deaf and dumb" be added after "blind."

Mr. Van Praagh seconded the amendment, which was carried unanimously.

The resolution as amended was then put to the meeting, and carried *nem. con.*

Dr. Burgerstein proposed "That the members of the Congress attending Section IV. desire to place upon record their appreciation of the services rendered to the Section by the president, honorary presidents and vice presidents, and the honorary secretaries, and to return to them their thanks for the same."

Mr. Jackson, in seconding the motion, said he believed he had been asked to second the resolution because he had been observed to be present at the meetings of this section every day since its commencement. He had been attracted there, in the first instance, by the interest that he took in the subjects which occupied the attention of the section, and the attraction had still continued, though there were counter-attractions in the other sections, and he felt bound to say that he had derived very great advantages from the papers, which had been most interesting, most able, and most useful, and would be of great importance to all of them individually, and he believed they would have a very important influence on the nation at large. He felt great pleasure in seconding the resolution. The business of the section had been conducted in an admirable manner, and he was sure the thanks of all who had attended the meetings were justly due, and would be heartily tendered to the gentlemen whose names they were all familiar with, the president, vice-presidents, and hon. presidents, and hon. secretaries, for their services. Now they were about to conclude, to depart from the Section, he was sure they would depart with a feeling of gratitude for the benefits they had received, and at the same time with a feeling of regret that the very pleasing and interesting series of meetings was now at a close. And he had now great pleasure in asking the Section to give their approval to the resolution that had been proposed and seconded.

The resolution was carried *nem. con.*

The President said, "I wish, ladies and gentlemen, on behalf of myself and of my colleagues, to return to the meeting our sincere thanks for the resolution which has just been passed. My own part in this work has been of the slightest character, but the work of the secretaries has been of a very heavy kind indeed. They have done that work, sparing no pains and no personal inconvenience to make the work of this section useful for its ultimate purposes. We are now about to separate again, and perhaps in the natural order of things it would be impossible that all we who have in common discussed subjects relating to the welfare of children should ever again meet under the same circumstances in the course of a lifetime. But wherever we go let us take, as I hope we shall, kindly remembrances of each other, and do good work for children in the same spirit which has animated this Congress from the beginning to the close. I have the honour, on behalf of my colleagues, of wishing you "Good-bye, and may every blessing go with you to your homes." (Loud applause.)

The meeting then dispersed, the speakers bidding each other a hearty "good-bye."

SECTION V.—CHEMISTRY AND PHYSICS IN RELATION TO HYGIENE.

Sir H. ROSCOE briefly opened the proceedings, regretting the sparse attendance. He then called upon Dr. A. Buchan to read his introductory address on "Meteorology in relation to Hygiene."

Dr. BUCHAN thought no city could be compared with London as affording the best available material for an inquiry into the relation of weather to health ; the data for the inquiry being supplied (1) from an enormous population spread over an area so restricted as to be influenced by one climate ; (2) there is a weekly return of the causes and rate of mortality. As a result of his observations, he found that the highest mortality occurred during the months of lowest temperature. He also noticed that the death-rate rose in proportion to the density and persistency of the fog.

Dr. RUSSELL pointed out with regard to London fogs, that when there was a great increase of death-rate a low temperature accompanied the fog, but that there were on the other hand several cases of dense fogs without decrease of temperature, and then the death-rate did not fall below the average, hence it appeared unfair to say that the fog itself was the sole cause of the great mortality.

Dr. G. B. LONGSTAFF stated that meteorological curves and curves of death, however closely related as cause and effect, could not possibly correspond exactly, owing to the fact that the interval between the death and its registration averaged about five days, and the interval between the commencement of an illness and a resultant death was of uncertain, often considerable duration. He stated that in his opinion meteorological changes were not of themselves the cause of death, though the number of deaths appeared to be contributed to by these changes. Fog alone or cold alone did not directly cause the deaths from respiratory diseases. He explained the curves of apoplexy and mortification by the fact that both are symtoms of disease of the arteries, chiefly in old people, that cold raised the blood pressure and hampered the circulation, resulting sometimes in rupture of an artery and apoplexy, in other cases in stoppage of the local circulation and mortification. He thought that Messrs. Buchan and Mitchell deserved great credit for their valuable improvement in the methods of exhibiting statistical results.

Dr. TRIPE said that Dr. Longstaffe had already referred to the interval which elapsed between the death and registration, also between the occurrence of the temperature and the death. He had in his investigations allowed two weeks, but he now thought that to be too small an interval except as regards diarrhœa and diphtheria. In the former the action of heat is rapid, so soon as the temperature of the soil at six inches, or of the Thames, reached 65°. As to the effects of fog they vary very much according to their density and quality. This was shown in January and February, 1880, when the fogs were very dense. The deaths from inflammatory diseases of lungs were more than double those of 1891, when the temperature was lower than in 1880.

Dr. NORTH drew attention to curves drawn by Professor Tacchini, showing the relation between the rainfall in the months of March, April, and May, and the number of cases of fever in the province of Rome in the autumn. As the result of his own experience in the Roman Campagna, he was led to entertain grave doubts as to the possibility of explaining the phenomena of intermittent fever on the hypothesis of a pathogenic organism. As to the mode of operation of climatic changes on the organism, it seems to account for the phenomena of the disease on some such hypothesis as this : The temperature of the body may be reasonably regarded as the result of the interaction of two rhythmically acting forces, interference with one or other of which will produce the phenomena of beats to which the regular intermission of malarial fever have at least a very close resemblance.

Dr. BUCHAN made some observations in reply.

Sir HENRY ROSCOE then called upon Dr. Buchan to read his paper on

INFLUENZA AND WEATHER OF LONDON.

London has been chosen because there is there a vast population in a small area, under the same climatic conditions : and because there is for London a weekly record of deaths and their causes over a long period. It is not intended in any sense to discuss the nature or treatment of influenza, but only to examine the record of deaths registered as due to it in London from 1845 to the present time. It is found that the figures disclose certain phenomena with such emphasis that, after giving a large discount for possible errors, the lessons taught by the phenomena stand unaffected. There is a strongly marked maximum mortality in winter, and an equally well marked minimum in summer. There is also a maximum in spring and early summer, chiefly occasioned by the epidemic of the present year. Considering now the weather at the times of the epidemics, it is seen that though they occur chiefly in winter, they are not connected with exceptionally cold weather, but rather with exceptionally warm weather. During the epidemic in the beginning of 1890, the registered deaths from influenza accounted for only about a seventh part of the large increase to the total mortality which accompanied the epidemic. This increase was due to the largely increased mortality from bronchitis, pneumonia, and phthisis, diseases of the circulatory system, and enteritis. The heaviest contributions to the death-rate were made by diseases of the respiratory organs, in spite of the fact that the temperature was exceptionally high and fogs absent, which was contrary to all rule, and indicated that during this period something of an exceptional character was operating to increase the deaths from diseases of the respiratory organs. The epidemic of the present year appears to contribute some valuable facts to the history of influenza, arising from the circumstance that it has occurred considerably later than the previous epidemics for which we have statistics, and thus offers different results as respects its complications with diseases of the respiratory organs, of the circulatory system, and of the nervous system respectively.

Dr. LONGSTAFF, Dr. GILBERT, Hon. ROLLO RUSSELL, Dr. TRIPE, and Mr. T. J. PERRY took part in the discussion, to which Dr. BUCHAN briefly replied.

Mr. GOODFELLOW then read his paper on

RECENT HYGIENIC IMPROVEMENTS IN THE MANUFACTURE OF BREAD.

The subject may be divided into—(1) Improvements in whole-meal bread. (2.) Improvements in other breads. The chief objections to ordinary whole meal bread are—1. The large percentage of waste, averaging 12½ per cent. 2. The increased waste of other foods produced by the ingestion of such whole-meal bread. 3. The unpleasant taste produced by the comparatively flavourless particles of bran. 4. The irritating action of the bran. 5. The rapidity with which whole-meal bread becomes dry and stale. The first four objections depend on the presence of coarse particles of bran. The last objection depends largely on the state of the whole-meal as regards moisture, before being made into bread. The chief efforts towards improvements in whole-meal bread, then, are necessarily directed towards the objects of—(1.) Obtaining a very fine meal. (2.) Obtaining a very dry meal.

Specimen 1. Triticumina bread.—Prepared from a very fine meal. The bran is literally cut by powerful steel machines into very small particles. The grains also undergo a special preparation by which the percentage of soluble carbo-hydrates is greatly increased. Waste in this bread equals 7½ per cent., as against 12½ in ordinary whole-meal bread. The meal is very dry, and yields a loaf which keeps moist for three days.

Specimen 2. Cyclone bread.—Marks a new departure in the preparation of whole-meal. The grains are pulverised in sealed chambers by air-currents produced by fans rapidly revolving in different directions. Advantages—(1) Meal aerated; (2) no metallic or stony adulteration; (3) meal is very free from aerial impurities, inasmuch as the air is filtered before being delivered to the "cyclone" chambers; (4) the meal is very fine.

These two varieties of whole-meal bread demonstrate the possibility of manufacturing bread in which the bran particles are so fine as to entirely obviate any irritating effects.

Non Whole-meal Breads.—The improvements may be divided into—(1.) Improvements in white bread. (2.) improvements in brown bread. White bread is deficient in—(*a.*) Proteid material. (*b.*) Fat. (*c.*) Mineral matter, more especially phosphates, sulphur, and chlorine. Any process which secures—(1) A higher percentage of proteids; (2) of fat; (3) of phosphates, &c.; and (4) of soluble matter may be regarded as an hygienic improvement in the quality of the bread. We are mainly concerned with the ratio of proteid material to carbohydrates. The standard ratio may be taken as 1 : 3·2. In ordinary fine white bread it is as 1 : 7.

White Bread.—Specimen 3. Black's Patent Fermented Bread is characterised by a high percentage of nitrogen, obtained by adding prepared gluten to the ordinary dough. Ratio of proteids to carbo-hydrates=1 : 3·6. Specimen 4. Diastase Bread.—Chief point of interest is the high percentage of soluble carbo-hydrates, obtained by adding diastase to the dough. Nitrogenous ratio= 1 : 6·5. Contains 80 per cent. more sugar and dextrine than ordinary bread.

Brown Bread—Specimen 5. Frame Food Bread.—A bread made from white flour, to which an extract of bran is added. The object is to obtain a loaf having the nutritive value of whole meal without the indigestible bran. Nitrogenous ratio=1 : 3·9. Contains 50 per cent. more mineral matter than fine white bread. Specimen 6. Germ Bread.—Rich in proteids, fat, and phosphates, obtained by the retention of the germ. Nitrogenous ratio=1 : 3. Specimen 7. Health Bread.—A finely granulated brown bread, in which the outer layers of the bran are rejected. Nitrogenous ratio=1 : 3 6.

The President said the manufacture of bread was of great importance.

Dr. Hamel Roos (Amsterdam) made some observations on the use of lime water.

Mr. C. E. Cassal also spoke.

Mr. Goodfellow briefly replied.

Sir Charles Cameron thought that good white bread was far preferable to the coarse brown breads which were upon the market. The white breads were more digestible than the brown varieties.

Sir Henry Roscoe next called upon Dr. Moody for a paper on "Aerial Disinfectants," by Dr. Moody and Mr. Streatfield.

In this paper the authors have made candles which on burning give off bromide, iodine, or chlorine, as the case may be.

A paper on "Aerial Disinfectants" was read by F. W. Streatfield and Dr. G. T. Moody.

Sir Henry Roscoe moved a vote of thanks to the secretaries, which was seconded by Sir Charles Cameron, who also proposed a vote of thanks to Sir Henry Roscoe, the President of the Section.

Sir Henry and Dr. Colman responded.

SECTION VI.—ARCHITECTURE IN RELATION TO HYGIENE.

On Thursday one of the more interesting papers was that of Dr. Sykes on

Block Dwellings.

In order to keep within reasonable bounds it is necessary to limit working-class dwellings to unfurnished dwellings, consisting of from one to three, or, possibly, four rooms, generally let on weekly tenancy, at rentals of from 2s. or 2s. 6d. to 7s. 6d., or perhaps even to 10s. This will include tenement, cottage, and block dwellings.

The type of the true cottage dwelling is the cottage with or without upper floor, self-contained, and occupied by only one family, although it is difficult to apply this term too narrowly. These dwellings still exist in large numbers in the metropolis, but their construction and surroundings are the very antithesis of suburban cottage dwellings, and they may in most cases be added to the category of desirable demolitions.

Block dwellings, on the other hand, are understood to comprise sets of dwellings super-imposed one above the other on the same base, possessing a common stair, and differing only from residential flats in length of tenancy, rental, and accommodation. Under the present inadequate restrictions as to construction, not a few recently-constructed dwellings of this type are nearly as unsatisfactory as the dwellings they have displaced. But the majority are well-built, and it only requires the framing of bye-laws, and their due enforcement in the construction of this class of buildings, to ensure that in future all shall be constructed with due regard to health. This is a subject which urgently needs the attention of the Legislature.

To provide for increase of population, cottage dwellings on new estates in the suburbs or the country, coupled with cheap and expeditious transit, are most desirable.

But in order to promote the health and comfort of town dwellings, the demolition of permanently insanitary and overcrowded dwellings, and of houses falling into dilapidation and decay, is necessary, and it is then a question of utilising the site. If the site is to be devoted to other purposes, then provision for a number of persons equal to the population displaced may be made by the erection of cottage dwellings in the suburbs, for instance, in demolitions made for railway purposes. If, on the other hand, new and improved dwellings are to be erected upon the site, these may be either cottage or block dwellings.

It then becomes a question whether small or large buildings should be erected upon the site. To erect cottage dwellings in the centre of cities would be costly, and would place the rental beyond the reach of the classes for whom they are intended. Besides, the over-crowded condition would be reproduced in housing the same number of persons on the same area, or a large proportion must remain unprovided for.

The object to be aimed at is to diminish the crowding by expanding the population through a greater amount of cubic space with increased light and air; and, whilst reconstructing, to provide improved sanitary arrangements, and to so dispose the dwellings as to enable them to be effectually supervised and protected.

The first consideration, therefore, is the amount of cubic space encloseable on square space.

The square space required for a cube to stand upon so that it may be surrounded by a square open area equal in width to half its height (assuming that contiguous cubes would provide the other half, so as to complete a width of surrounding area equal to the whole height) would be twice the length of the base or side of the cube squared—$(2 S)^2$; whilst the capacity of the cube would be the length of the side cubed—$(S)^3$. (See diagram A.)

So that a cube containing 64,000 cubic feet would require only 16 times instead of 64 times the area of square space required by a cube containing 1,000 cubic feet—a simple and striking illustration of the gain of cubic space upon square space by increase in size under similar conditions. The effect upon the construction of buildings, although following parallel lines, is not such a simple deduction, but upon the same area and under the same conditions a much larger proportion of cubic space to square space may be enclosed by increasing the size of building, and the dwelling space may be further increased by the economy of staircase space and terrace construction in erecting rows of blocks.

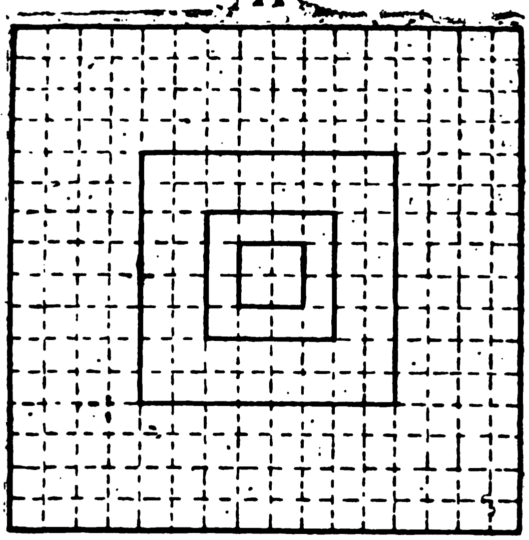
In order to estimate the comparative amount of cubic space enclosable in actual building it is desirable to briefly consider the height, depth, length, and spacing of blocks.

The height of rooms must be proportionate to size for the purpose of lighting and ventilation. So that about ten feet may be assumed as a good standard for moderate sized dwelling rooms. Whatever the height adopted, it is not desirable that the rooms in the upper stories of a block should be of less height than those of the lower.

The number of stories is obviously governed by the height of the rooms and the total height of the building.

The total height of blocks is limited by many considerations. It is highly desirable, almost necessary, that a street should run between every alternate row of blocks. There is a height beyond which it is on all accounts false economy to build. So that blocks would be limited to a height of from 40 to 60 feet, or to four or six stories of ten feet; practically the latter is about the present maximum limit.

A



The depth of ordinary double-fronted terrace houses may be roughly taken as varying from 25 to 35 feet, and by doubling the maximum assumed depth of a single room (15 feet), a depth of 30 feet is reached.

There is no advantage in constructing rooms for the working class families of a width or length in the line of frontage requiring more than one window to adequately light them, and the width of the room must be governed more by the width and situation of the window than by the height or depth of the room.

Block dwellings encourage increased length as well as depth of rooms on account of the greater economy of ground space obtained in many storied as contrasted with single-storied dwellings.

The healthiest condition of construction is that in which through ventilation, or perflation, may be obtained. Blocks may be so constructed as more or less to re-produce one of the bad features of back-to-back houses.

The length of a row of blocks is limited by the length of the ground area, but it is also desirable that the blocks should not be more numerous than the superintendent can efficiently supervise and protect.

Given the principle that the fronts of all buildings should face open spaces proportionate to the height of the buildings, and along their whole length, and that the rear space should not only remain open, but should not be converted into a public thoroughfare (a most important point), there is no economy of ground space in constructing single-fronted buildings, whether they are back-to-back or not.

Out-buildings, towers, or projections abutting at right angles to the line of frontage are objectionable by impeding light and air on either side, in proportion to the distance they advance from the main front, and according to orientation. On the other hand, there is great advantage in being able to obtain cross-ventilation and cross-light between the main building and the projection when this contains the sanitary arrangements. Where such projections are constructed an additional amount of open space should be required in proportion to the projection, and the projection should not be allowed to advance so as to obstruct exterior perflation, and on no account so far as to close up the stretch of open space, whether in front or at the rear, forming a *cul de sac* in either case, the one of the courtyard and the other of the street, nor should terraces be permitted to abut directly upon one another at right angles.

Terraces of blocks being double-fronted, both rear and front should face open spaces proportionate in width to the height of the buildings. That the width of open space on both frontages should be proportionate to the height of the dwellings is accepted, and anything less than a width equal to the height of the building above ground level would be unacceptable to hygienists.

The reckless manner in which at the present moment blocks of dwellings are being erected, with an utter disregard for this provision of light and air, calls most urgently for legislative restrictions in the construction of this class of buildings.

The growing antipathy of philanthropists to block dwellings is greatly justified by the dread of the ultimate effects of the total absence of any restrictions as to this class of buildings erected on old sites. The crusade against insanitary dwellings, without adequate restrictions upon the buildings that will replace them, may make the last state worse than the first.

Having briefly considered the conditions of construction, we may calculate the relative amount of cubic space enclosable on a rectangular area under varying conditions of height of building. Such a calculation would only apply to a small area, at the most limited to a few acres, for in a larger area other factors would be introduced which are beyond present consideration.

When superimposing dwellings one above the other, for every additional floor or story, the floor area of the story is economised, and it is only necessary to provide space equal to the areas of the two fronts. One interspace will serve the opposed fronts of two blocks, that is, each block will have on either side of it one-half the amount of open space due to it, and the width of open space to be calculated with each block will be proportionate to the height and number of the stories; the same applies to the ends of the rows of blocks. Therefore, the depth of the block, plus the width of the open space on one side, will equal the depth of total space occupied by one block, and this, divided into the total depth of the area, will give the number of blocks. Assuming that the length of the blocks is equal to the length of the area, less the space required at each end, and that each story or stage is of the same height, then the cubic capacity of one block multiplied by the number of blocks will give the total cubic space enclosable. (See diagram B.)

(1.) The first step is to find the number of rows of blocks.

Let D = total depth of area;
d = depth of one block;
h = height of one story;
n = number of stories;
w = width of one interspace;

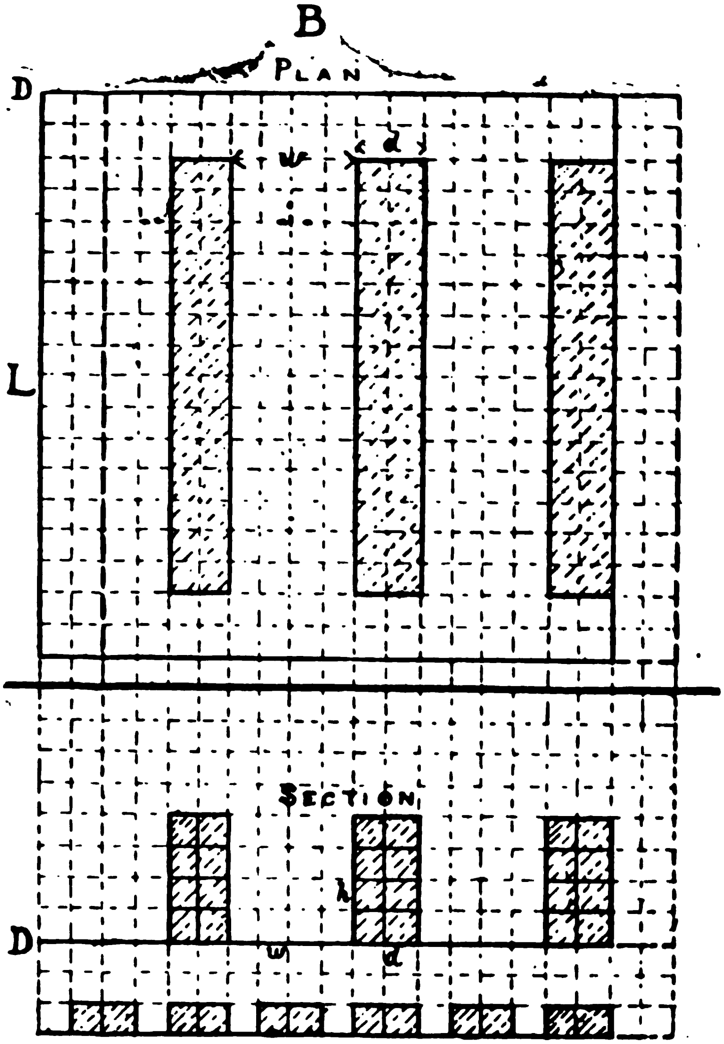
then $w = h$ and $\frac{D}{d + nh}$ = number of blocks.

(2.) The second step is to find the cubic capacity of one row of blocks.

On an area 500 feet by 230 feet, equal to 2·8787 acres, the amount of cubic space encloseable per acre, would be—

1 story high	-	312,641 cubic feet.				
2 stories	,,	-	479,383	,,	-	53·3	Increase per cent.
3 ,,	,,	-	573,173	,,	-	19·5	
4 ,,	,,	-	625,282	,,	-	9·1	
5 ,,	,,	-	651,333	,,	-	4·1	
6 ,,	,,	-	660,020	,,	-	1·3	
7 ,,	,,	-	636,546	,,			

On the above area buildings four stories high would enclose double the amount of cubic space of buildings one story high under the same conditions.



Let d = depth of one block;
h = height of one story;
n = number of stories;
l = length of area;

then $d \times nh \times (l - nh)$ = cubic capacity of one row of blocks.

(3.) The third step is to find the total cubic space encloseable.

Let N = number of rows of blocks;
C = cubic capacity of one row of blocks;

then $N \times C$ = total cubic space encloseable on the area.

So that, given an area, the greatest amount of cubic space encloseable with due regard to health provisions may be calculated, and the cubic space adopted as a uniform standard more valuable that the mere number of tenements, or of rooms, or the square space, as a basis of calculation for the size of block buildings, cost, accommodation, density, and mortality.

It has been urged that block dwellings are repellant, from their unsightliness, to the classes sought to be attracted; but it is a poor compliment to the resources of architects to attribute to them inability to provide embellishment at moderate cost by beauty of form, colour, and ornament. The objection that the working classes avoid them on account of their collective arrangement, and the objection that a class superior to those they are intended for takes possession of them, as well as the fact that residential flats are in favour, may be left to the objectors to reconcile with the construction of the dwellings and the habits of occupants.

Only improper usage can cause deterioration, and this applies equally to the small as to the large building.

The staircase open to the street is rightly regarded as a most objectionable feature. The staircases of tenement houses whose front doors are rarely closed are largely accountable for the defilement and destruction in this class of houses, and the same deterioration will ultimately doubtless take place in the blocks which replace them. It is necessary to distinguish between being open for the purpose of light and air, and being open to the access of any and everybody who chooses to enter. The former is as highly beneficial as the latter is detrimental. The staircases should open into the intervening space between the rows of blocks, but there should be only one public or main entrance to the courtyard or garden of block dwellings, and this should be directly under the control of the superintendent.

Apart from the influences of town life, is there any reason to suppose that block dwellings are *per se* unhealthy? Residential flats are not held to be less healthy than self-contained houses. Provided that the proportion of open to covered space is adequate to permit of proper access of sunshine and delight, of sufficient aeration and perflation, increased height of building can scarcely cause any direct injury to health. On the other hand, the conditions of life are dissimilar in cottages and in blocks in important respects.

In block dwellings the families, and especially the children, are brought into closer and more frequent contact, and the sanitary arrangements are under more constant supervision. The effects of these conditions upon the mortality, as compared with London generally, have been most ably demonstrated in a paper upon the vital statistics of block dwellings read before the Royal Statistical Society in February of this year by Dr. Newsholme. He showed that, notwithstanding that the age-distribution of population in Peabody buildings was much less favourable to a low mortality than in London as a whole, the death-rate was 2 per 1,000 lower, and that the birth-rate was much higher, and the infantile mortality much lower than in all London. But that the death-rate of children between one and five years of age was higher, and was caused by scarlet fever, diphtheria, and still more largely by whooping cough and measles, diseases to which children are so prone, and which are communicated mainly by direct infection. In this respect the social condition induced by block dwellings resembles schools, and is equally remediable. Another point elucidated was the influence exerted by the greater supervision of sanitary arrangements, in the fact that the death rate from typhoid or enteric fever was one-half that for all London, and it is well recognised that this disease is the best test of sanitary conditions available.

The distinction between dwellings with private sanitary and domestic conveniences and those with conveniences in common is important, as it materially affects the social conditions, as well as the cost, and also the cubic dwelling space available. The aim should be to construct blocks of "homes."

Sir Arthur Blomfield here vacated the chair, which was taken by Mr. Blashill, the superintending architect of the London County Council, when an interesting discussion took place upon the relative merits and demerits of cottage residences and block dwellings, upon the difficulty of building suitable residences at sufficiently low rentals for the working classes, upon the height to which the artizans' dwellings are carried in London and other towns in proportion to the amount of air space back and front, and other matters in connection with the foregoing papers, in which the following gentlemen took part: Mr. E. Bond, Dr. Noble Smith, Mr. F. Neville, Mr. Seddon, Mr. Burroughs, Mr. Hooper (a director of the Victoria Dwellings Company), Mr. H. L. Beckwith, Mr. Councillor Hanham (Leeds), Mr. Collins, Dr. Grimshaw (Registrar-General for Ireland), Mr. Gordon Smith, and Mr. Arthur (Leeds), the outcome of which was that the meeting unanimously arrived at the following resolution: "That special legislation to control the construction of block dwellings for the industrial classes in cities is requisite."

On Friday the section was occupied in hearing papers on "English Isolation Hospitals," by Dr. Thorne Thorne, Mr. Keith Young, F.R.I.B.A., and Rev. J. F. Few, and a discussion took place.

In the course of the meeting, it was moved by Mr. Atha, and seconded by Mr. Fosbrooke, "That in the opinion of this meeting it is desirable that Legislature should give power to County Councils for acquiring isolation hospitals and ambulance service in the interest of the counties, and to take over by agreement the existing isolation hospitals."

Thereupon an amendment was moved by Dr. Sykes, and seconded by Mr. Alderman Domville, J.P., "That the question be referred to the section on State Hygiene," which was carried.

The President having called attention to the fact that in the Section on State Hygiene the following resolution had been arrived at, "That this meeting cordially approves the principles of statutory examinations and registration of architects," it was moved by Dr. Sykes, and seconded by Mr. Turner, F.R.I.B.A., "That the members of the Architectural Section desire to consider the resolution adopted by the Section on State Hygiene, approving of the statutory examination and registration of architects, before definite adoption by resolution of the Congress, and that they are of opinion that this question should have been referred to Section VI., Architecture in Relation to Hygiene."

The meetings of this section then terminated by a vote of thanks to the President (Sir Arthur Blomfield).

SECTION VII.—ENGINEERING IN RELATION TO HYGIENE.

This section met at ten a.m., Sir John Coode, President, in the chair.

The first paper read was on

Municipal Engineering,

By H. Percy Boulnois M.Inst. C.E., Fellow San. Institute, etc.

The author gave a lucid exposition of the magnitude of the work, and detailed the best methods of administration.

Mr. H. A. Raechling pointed out the many and various duties of an engineer. He alluded, in touching language, to the late Mr. Girder, under whom he had served for a number of years. It was not the work connected with the duties of a municipal engineer which was troublesome, but the worry. Some Corporations appeared to think that they had the right to dispose of the body, soul, and spirit of the municipal engineer. This he considered was a crying shame, and engineers ought to prove to the Corporations that they cannot do with them as they like.

Mr. Binnie thought that it was the duty of a municipal engineer to do his duty to the public and to himself, to work conscientiously, and he might safely wait patiently for his reward.

Mr. John Thornhill Harris agreed with Mr. Binnie, and alluded to the many new duties that municipal engineers had now to perform.

Mr. H. Boulnois, in his reply, said that any man who was conscientious, and who took an interest in his work, was bound to worry, and he did not think a man was worth his salt who did not worry, but that it was important that he should not let anyone know that the work caused him to worry.

Herr W. Kummel, Altona, read a paper on "The Epidemic of Typhoid in Altona, 1891, and the Filtered Water."

The author showed a map of the town with all the cases of typhus, several diagrams showing the rainfall during nine months, the level of underground water, &c., and statements of the cleaning of the filter beds; also the construction of the filters, and the quality and thickness of the sand, etc.

The Water Supply of India.

By Surgeon-Major Robert Pringle, M.D.Edin., late Sanitary Department, H.M. Bengal Army.

In discussing this subject Dr. Pringle drew particular attention to the vast importance now attached to it, and instanced the cases of the water supply of Glasgow and Liverpool, the former completed, and the latter approaching completion. He pointed out that the vast outlay in capital was practically unthought of when the object aimed at was an ample supply of good water for an increasingly populous city, and remarked that if this was necessary for the wants of this country, how much more was it so for India, with its practically total abstaining population, proverbially indifferent to the purity of water, like their sacred cows who seem never to be particular on this point, and drink water from filthy ponds. Dr. Pringle admitted that the water supply of the larger cities in India was now receiving considerable attention, but the population of India, he remarked, did not live in the cities—quite 90 per cent. were to be found in the villages. The part of India to which these observations chiefly referred was the Bengal Presidency, in which he had spent thirty years, of which eight years were in Lower Bengal, and twenty-two in the North-West Provinces, the latter in the upper portions of the Mesopotamia of the Ganges and Jumna. For twenty years, from 1864, Dr. Pringle was the sanitary officer of this large and densely-populated district, containing upwards of ten millions, crowded together to the extent of 500 to the square mile, and it was here that the practical experience of Dr. Pringle on this subject was acquired, as for twenty years continuously he marched up and down this district, which contained large cities like Agra, Meerut, Multra, Saharanpur, etc., and the hill sanatoria of Landour, and Chuckrata in the Himalayas. In this district also are the sacred shrines of Multra, Bindrabun, etc., and places of pilgrimage on the sacred Ganges and Jumna, from Hurdwar to Allahabad on the former, and Kalsi (where the Jumna leaves the Himalayas) to the union of the latter with the former at "Pryaz," or Allahabad. This district further is one of the highways of India, and through it hundreds of thousands pass and repass on their way to the Punjaub from Bengal and Southern India. The water supply for a migratory population like this, greatly given to pilgrimages was therefore a matter of the highest importance, not only to the wayfarers themselves, but also to the resident population of the districts through which they passed, and yet, it is here the water supply not only on the roadside, but all along the line of railway, is as unsatisfactory as it could well be, and this not owing to the absence of water or wells, but to the insanitary condition in which they are kept, due to the utter absence of any proper supervision over this first necessary of health.

The water supply of the plains of India was discussed under three heads (that from artesian wells being still under trial), viz.: Well, River, and Tank or Pond Water. Well Water.—This seems to be the source of the drinking water supply of nine tenths of the population of India, and the quality varies with the construction of the well. The faultless masonry tube of the ideal well supplies different water to the well, which is little better than a hole in the ground, the sides of which are often the home of pigeons and other birds, while at the foot of this well, if such it can be called, is a deep layer of leaf-mould, through which the water is forced by the spring level. The position of these village wells was often as faulty as their construction, and what with overhanging trees, whose leaves drop into the well, and whose roots lead the surface drainage almost unchanged into it, with an absence of parapets, these water-holes are converted especially in the rains, practically into cesspools, and outbreaks of disease, called cholera, are not unfrequently due to this horrid pollution of the drinking water supply. If this is a description of a village well, it differs little, as regards the impurities in it, with the exception of the masonry tube, from the general run of wells in India, and the indifference with which even the upper class of natives view this impure condition of their drinking water supply is almost incredible, while the shadow of a stranger passing over the cooking place of the Brahmin defiles it! As regards the roadside and encampment wells, many of them, though very well constructed, contain, from the absence of daily withdrawal of sufficient to keep it pure, water quite unfit for drinking purposes, while leaves and leaf-mould fill up the measure of impurity, and many a case of typhoid fever, the origin of an epidemic in a cantonment, was without doubt due, on the line of march, to the impure water of these wells. In the matter of the railway station wells, anyone who stood for a little time at the well would see enough in a few minutes to explain how it is that the increase of railway communication over India has been the means of spreading epidemics with a rapidity and fatality unknown before. With our present knowledge of how little is necessary in this country to start an outbreak of typhoid fever, when the water supply has been rendered impure by only a single case of this disease, it is a most hazardous proceeding to use river-water in India, for a drinking water supply, and nothing would induce me to use it for this purpose without boiling it first."

Tank or pond water.—This was open to even more objections than the river water, as it was practically unchanged water, and though there were said to be water plants which were credited with purifying this water, for his part, he would prefer 212 Fahr. if he had to drink such water. In some parts of India, where during the rain it was difficult to keep the well water free from impurities, there was a plan of collecting rain-water for drinking, which, if simple, was very effective. It consisted in collecting the rainfall on a large cotton sheet, tied up at the four corners to four feet high poles, in which a stone in the centre made the water gravitate here, and pass into a clean jar below, from which it was emptied into large jars specially made for storage and kept in a cool place.

The remedies for the unsatisfactory condition of the water supply generally as just given were simple, cheap, and effective, and consisted in the cleaning, emptying, and supervising of these wells. The first by a bull's dredger, the second by using the wells generally where necessary, for irrigation, and the third by registration of all public wells containing good water, and closing of those in which the water could not be kept good, covering railway wells and putting a pump on them, or filling a tank when raising the water for the engines, and attaching two taps to this tank, one for Hindu, the other for Mahomedans. But it was to this leaf-mould at the foot of wells to which the greatest importance must be attached, where there is such an awful death-rate from fever. Without entering into the details, which Dr. Pringle did most carefully, his views may be summed up in saying that he thought it as possible to drink the malarial poison from the water in these wells, forced through this leaf-mould, the home, no doubt, of the malarial germ, as it was to inh [illegible] r, and he stated, as the result of inquiry, that a Bull's dredger, such as he described as being incomparably the best, cheapest, and most efficient method of cleaning these wells, would cost in India, complete, with derrick, windlass, and one hundred feet of chain, suitable for conveyance in a cart, and capable of erection in fifteen minutes, one hundred and eighty rupees. This should be used regularly for a group of public wells, and one, at least, should be in use in all large military cantonments and large native cities. In short, he seemed to view this impurity in these wells as the most serious, and yet the most easily removed. Everything recorded or suggested in his paper would be found in his annual reports for the twenty years from 1864, and paid the following tribute to the value of total abstinence in the Army, and the favouring circumstances which now, thanks to Sir Frederick Roberts, the present Commander-in Chief, surround this great measure for improving the moral, social, and physical condition of the British soldier in India. Dr. Pringle stated that the credit which the Sanitary Department in India claimed for the increased value of the British soldier's life in India was, as regards the water supply, not due to them in the very least, which he stated in the following telling words: "Take, for instance, the sanitary condition of the first circle (Dr. Pringle's for twenty years) as regards the work of the strictly Sanitary Department, it was worse in 1884 than it was in 1864, as I am prepared to prove, for the defects of 1864 were allowed to go on unheeded and unremedied till 1884, when a widespread epidemic of typhoid fever was the penalty of years of the gravest violation of the first principles of sanitation in the matter of the water supply." It was moral, not physical, sanitation which had effected such changes and improvements in India.

Mr. Maignen spoke on the importance of filtration and the boiling of water. Water boiled for five minutes will become putrid in three days, water boiled for fifteen minutes will become putrid in one day. He explained that the spores in the water are incubated by the heat. Mons. Maignen then alluded to experiments which were being carried on in Paris, which he was not permitted to disclose, and hinted that the future purification of water will be by chemical means.

Dr. Simpson said the last speaker had laid great stress on the purification of water by filtration, but Dr. Simpson took different views, and considered that the supply should be taken from a pure source, and then elaborate filtration would not be required. He instanced the water supply of Calcutta. The water supply was changed in 1869; and five years previous the deaths from cholera had been 21,000, the next five years there were only 5,000. During the next five years the supply was altered from a constant to an intermittent supply, the deaths rose to 7,000; the conditions remaining the same, the deaths rose to 9,000 during the next five years. A better supply was then given, with the result that during the last five years the deaths from cholera have been 5,000.

Mr. Binnie said they were all indebted to Dr. Pringle and to Dr. Simpson for their valuable remarks.

Surgeon-Major Pringle and Mons. Kummel replied.

Sir John Coode said that the time had now arrived to close the work of the sections, and wished to express his thanks to the gentlemen who had come forward to read papers, and also to Mr. Middleton for his valuable services.

Mr. Middleton replied, and expressed a vote of thanks to Sir J. Coode.

This was carried with acclamation.

Sir John Coode then replied, and the work of the Section then closed.

SECTION VIII.—NAVAL AND MILITARY HYGIENE.

Dr. Louquet (Paris) kindly consented to preside in the absence of Lord Wantage, and, later on, the meeting was presided over by Dr. W. J. de Meyer (Department Surgeon-General of the Army of the Netherlands).

Enteric Fever in the European Army in India: its Etiology and Prevention.

Was read by J. Lane Notter, M.A., M.D.

Enteric fever, as regards its frequency, marks widely its difference to all other forms of disease; it knows no geographical limit, and its very universality makes it one of peculiar interest to army medical officers. In India the subject is one of especial interest, inasmuch as there is a wide-spread belief that this disease, although it has existed for many years in that country, has, in spite of sanitary improvements, increased, and that the mortality from it each year is growing greater, rendering service in that country more hazardous than formerly; and this, notwithstanding the regular diminution in the general mortality of the army serving in that country. But an important fact to be noted is that concurrently with this increase in the enteric fever mortality there has occurred a decrease in the mortality from intermittent, remittent, and simple continued fever. The most obvious explanation of this increase in enteric and concurrent decrease in other fevers is, that it is owing to difference in nomenclature; that is, the deaths formerly returned as from remittent fever are now returned as from enteric fever. There are, however, other factors, the more important of which are the short residence of men now in that country, and the increased disposition to this disease at the early age at which many men are sent to serve in India; the alteration therefore of the age, constitution, and recent arrival are to be considered as predisposing factors in the increasing prevalence of this disease. Among much that is doubtful and difficult of explanation, it may be considered as proven that enteric fever, as known in Europe, prevails in India; that it owes its prevalence to the same causes, polluted soil and polluted water, aided by the condition of the soil, high temperature, and humidity. These causes are widely diffused throughout India, and, therefore, a widespread prevalence, though to be lamented, is not to be wondered at. The cleansing of the soil, which has been polluted for ages, seems almost an impossibility; but a pure water supply ought to be within our reach, and this and the careful removal and disposal of excreta would seem the only means we at present possess to combat this disease in that country.

A paper was next read on

Enteric Fever in Campaigns: Its Prevalence and Causation.

By A. M. Davies, D.P.H. Camb., Surgeon, Army Medical Staff, etc.

The great prevalence of enteric fever amongst armies in the field, he said, was shown by reference to the experience of the campaigns in Africa, Afghanistan, Egypt, Burmah, the United States, and Tunis. The chief features presented by outbreaks under the conditions of camp life were mentioned. Malarial, pythogenic, and specific causes were discussed, and the pythogenic theory was considered, with reference to the probable bacterial origin of the disease. Dr. Davies concluded that the enteric fever of campaigns is of pythogenic origin, due to a specific bacterial parasite, which parasite need not necessarily be derived from a pre-existing case, but may have developed its specific characters and disease-producing properties by a process of evolution under favouring conditions

This paper was followed by a paper by Dr. Edward Squire, M.D., on "Camp Fevers: Their Origin and Spread."

The following paper on the

Prophylaxy of Typhoid Fever in the French Army

was read by Dr. Schneider, Médicin Major 1st Class, attached to the direction of the Medical Service at the

Ministry of War, Paris. At the Congress of Hygiene, held in Paris in 1889, and at the International Medical Congress held in Berlin in 1890, I had the honour to explain what had been done by M. de Freycinet, Minister of War for the prophylaxy of infectious diseases, and more particularly that of typhoid fever in the French Army. I propose to-day briefly to inform you that the progress which has been realized during the preceding years has been exceeded during the first half of the present year, and that the diminution in typhoid sickness and mortality has not only been continuous but also progressive. Thus the medical statistics of the Army prove that the cases of typhoid fever in the French Army were—In 1887, 5,991 men; 1888, 4,883 men; 1889, 4,274 men. And that the cases of typhoid mortality were—In 1886, 964 men; 1887, 763 men; 1888, 801 men; 1889, 701 men. The medical statistics for the army has not yet been published for the year 1890, but the monthly accounts which have come to the knowledge of the direction of the medical service, and which are only affected in a small degree by the absence of a few individuals attacked being, by permission, at their own homes, give the following results: Cases of sickness, 3,491; mortality, 572. The first half-year of the year 1891 compared with the same period in 1890 thus shows considerable progress. So, whilst the monthly account of the first half of 1890 shows 972 cases and 252 deaths, that of the first half-year of 1891 only gives 788 cases and 191 deaths. This diminution of 184 cases and 61 deaths in the first half-year leads us to hope that the total for the year 1891, compared with 1890, will give a diminution at least equal to that which was gained in 1890 over 1889. The continuity and natural progress of this diminution demonstrates how rational and profitable has been the course pursued by the Ministry of War and the medical service of the French army in the prophylaxy of typhoid fever. It is, in fact, acknowledged that the disease has been combatted by the progressive improvement in the drinking water, and in the latrines of the different barracks. There is a tendency everywhere to replace latrines by trenches, sewers, or movable receptacles; as to drinking water, everywhere where it is possible to use spring water of undoubtedly good quality, or to employ Chamberland filters. The cause of military epidemics of typhoid fever are almost always traceable to the adulteration of drinking water by fæcal matter; the analyses made at the bacteriological laboratory of the School of the Val de Grace clearly prove this. I have before mentioned the epidemics of Beauvais, Verdun, Luneville, Mezières, Cherbourg, L'Orient, Dinan, Nice, Angoulême, Mirande, Agar, and Paris; to-day I will add the more recent epidemics of Courbeovie, Avesne, Versailles, Lisieux, Montarges, Auxonne, in which the laboratory of the Val de Grace has discovered either the bacillus of Eberth, that known as the Bacterium Colé, or an excessive abundance of microbes of putrefaction. The immunity gained by the installation of filters, and by the use of spring water in the numerous garrisons which were formerly so afflicted, has been maintained during the last two years; we may, therefore, anticipate the best results from the general introduction of the prophylactic measures ordered by M. de Freycinet. Doubtless, we are still subject to sad surprises, when a source which seems to offer every chance of security becomes suddenly affected by fæcal infiltrations; but in spite of some accidental epidemics, we may rest assured that at present cases of typhoid fever are only seen in the sporadic state in garrisons where once it made fearful ravages under an epidemic form.

Discussion on Enteric Fever.

Brigade-Surgeon **Staples**, M.S., after complimenting the readers of the papers, took up the question of the prevalence of enteric fever in India. He passed over the question of the causation of the disease, whether from microbic biological development or from their chemical products, and went on to the practical questions regarding them, which are tangible and within our reach. He said there were four main factors underlying the great problem, namely: (1) The undue susceptibility of the newly-arrived in the country; (2) the still greater susceptibility of those who arrived at an unsuitable season of the year; (3) the undue susceptibility of individuals within the Septennial period from 18 to 25 years of age; (4) adverse surroundings. He then asked the meeting to allow him to put aside the two latter points for the purpose of enabling him the more to emphasise the two points, viz.: The cases of the newly-arrived and those who arrive at an unsuitable season. He then traced the fatality from fever in Bengal from 1860. The first year's statistics were available to the present time, and examining these figures by the factors showed in a variety of ways how they influence the millesimal ratio of mortality. Beginning with the later years of the Mutiny, he said that the great increase in the mortality followed the influx of Europeans into the country, by which the strength of the army was increased from 12,000 to 42,000, and who, owing to the exigencies of the Government, were poured into the country, occasionally at least, at unsuitable seasons of the year. He then showed that until 1869 there was a decrease in the fever mortality till the year 1868, and explained it by showing that during these years the Bengal European army recruited itself, and practically there were no new arrivals in the country and, moreover, during these years the troops reached the country by the old way round the Cape, and in November when they had a long cold season before them. He then mentioned the great change which had taken place in the years 1868-69, when the fever mortality rose enormously. He said this was due to the great fact of the great exodus that took place from the European army by the men who enlisted in 1857 and 1858 leaving under the then introduced new system of what was called limited engagement, who were climatically seasoned troops, by newly arrived and generally younger men, and many of them, owing to the then newly introduced system of sending troops to India by troopship, and when, owing to the system, many of them arrived late in the season, or, in other words, at an unsuitable season of the year. He then showed from an examination of the record, that from then there was for some years a stationary but high fever mortality, and that with reference to this the condition of the troops as regards the main factors, were the same, in other words, the proportion of newly-arrived and the season at which they arrived, until 1879-80-81, the year of the Afghan war, when there was a great increase in the adverse conditions of the troops. He next mentioned the fact of the increase of the army in 1881 by 8,000 men, notwithstanding which the fever mortality fell, the explanation being that they were tropically seasoned troops from Egypt and who were not newly-arrived in the service, going from our climate. He next passed to the question of drafts arriving in India in the early cold season and the first troop ships, and those arriving at the beginning of the hot season, and from his own experience that the latter furnished the enormously greater majority. He then drew the practical conclusion, viz., that as regards the Bengal European Army, it is necessary to retain the soldiers, and to resort to the old system of landing troops in that country, and giving them the cold weather before the dry season begins, and by the reversion to the old condition, to get was the old millesimal rates of fever mortality in India. He then incidentally, and in conclusion, condemned the Indian system of trench conservancy, saying that where you had to rely on well-water it must follow inevitably that pollution must occur.

Surgeon-General **Marston** said that, as he had only a few minutes to speak, he desired to make his remarks, like the last speaker, as practical as possible, considering too, that this was a Hygienic Congress. He dwelt especially upon the circumstances under which this fever occurs in campaigns and in India, and upon the importance of selecting the right season for sending out our troops to hot climates, and, in case of war, thought that more might sometimes be done in the selection of regiments. Whether the disease were attributable to the bacillus of Eberth and Gaffr or not, or to any other micro-organism, it would not do to stop there. We wanted to know what more could be done to protect our troops abroad and in the field against this fever; and what practical suggestions could be made in this respect? Everybody recognised the importance of the subject of the necessity of obtaining a good and wholesome environment, and of the application of sanitary measures. What he wanted was something to indicate that the discovery of "a particulate" as a cause, to give us more clearness and precision in the application of our hygienic regulations. He should like to hear what medical officers who had recently returned from India had to say about the conservancy water supply, and local conditions of military stations there at the present time.

Brigade-Surgeon HARVEY said that the man who has seen most of Indian fevers should be the last to dogmatise about them. He believed that the last word was far from having been spoken, and that much remained to be done before we could be sure that our information was completed. He had seen many typical cases of enteric fever, and many of remittent fever; many also of a fever which in former years used to be returned as remittent, but which were now entered as enteric, and this raised the apparent numbers of that disease. In these cases the temperature charts did not correspond with the typical charts as given by Wandeslich and others. For some time it had been present in his mind that there might be another variety of fever intermediate between enteric and remittent, yet differing from the one in important particulars, especially the range of temperature and the pathological appearances, and from the other in not being influenced by quinine. In our latest little war on the Miranzai frontier, of which he had the honour to be principal medical officer, fourteen cases of remittent fever were returned among the native troops and followers, and among the British troops, while six cases among the latter were returned as enteric. The diagnosis was made by a more careful and competent man, and the cases corresponded to hundreds of others annually returned as enteric fever. If we accepted Surgeon Davies' theory of possible origin there was no difficulty in accounting for them; but if we consider the disease to have a specific origin, then, as the men had left India longer than the longest supposed incubation period, and the native population knew nothing of a fever lasting three weeks and ending in death, it was very difficult to account for them. None of the men died, but the temperature charts did not correspond with the Eastern type, and were similar to those of the remittent fever cases among the native troops. The conditions under which the troops were serving were such as are supposed to be favourable to the genesis of remittent fever. High steep mountains, separated by narrow valleys, a hot sun by day, cold, bright, heavy dews, and occasional heavy storms, drenching men bivouacing without tents. He had no doubt that a few years ago all these cases would have been returned as remittent fever, and by many medical officers even now. He thought that pending further investigation the term typho-malarial, as recognised by the American nosology, might be used provisionally and as a matter of convenience. It was clear that cases, such as had been quoted by Dr. Squire, could not be examples of the same disease, and that further observations were required. He considered that the term typho-malarial did not imply a belief that enteric and malarial fever were combined, the typhoid state being common to many diseases. He might say the answer to a previous speaker as to how governments might reduce disease on service, that the results of the recent expeditions had been most instructive in many ways. The first had been fitted out regardless of expense, with the result that the native troops and followers had been found more healthy than the average of men in cantonments, although they were constantly marching through deep snow, and had to endure temperatures of as much as 20 deg. of frost. The second gave similar good results for the native troops, but the British troops, and especially the 1st King's Royal Rifles, who were young troops, fresh from England, and under unfavourable circumstances, suffered severely; giving 1,690 admissions per 1,000 per annum, as against 525 per 1,000 for the native troops. It was also interesting to know that this last expedition lost more men at the hands of the enemy than from disease.

Brigade-Surgeon ROBERT PRINGLE, H.M. Bengal Army, said: The question of the increase of enteric fever in India is one which must be studied with reference to the physical condition of the locality, and taking Murat as an instance of good drainage, from good waterfall, with a terrible prevalence of malarial fever from the inundation of the canal water, here enteric fever is naturally less. Ordinary malarial is more prevalent in Lucknow; where these conditions differ and every facility is available for soil and water pollution, Here we have true enteric fever in its highest prevalence. The game of lawn tennis, from the conditions under which it is enjoyed, is most favourable to the ordinary form of malarial fever, the severity depending on the state of the secretions. If the patient is temperate and in good health, the attack, if taken at once, is invariably slight; if, however, there is chronic biliary derangement from intemperance and other causes, then it is complicated with dysentery, and often ends with abscess of the liver. The chief diseases of troops on service depend very much on the country through which they pass. Where there is high jungle table-land, the fever, though very general, yields to treatment, and the mortality is very low. If there is much damp and exposure, the type of the disease from biliary complications seems to change, and it becomes more continued and more fatal, and requires the most careful nursing, while the convalescence is prolonged and the recovery retarded, and without a complete change of climate the sufferer is rarely fit for active service.

Brigade-Surgeon T. MAUNSELL desired not to speak as a scientist or as a statistician, but as a practical sanitarian. As regards the age of enteric fever in India, I spent the greater part of the year 1861 in the Quartier Latin, in Paris, and saw a great deal of enteric fever there; on going to India in 1862 I failed to recognise the same disease, except in a few mild and doubtful cases. I mean the disease did not exist to any appreciable extent there. In reply to Surgeon-General Marston's question what can be done to further protect our troops in cantonments or elsewhere, I should like to say that whatever else we may do we should at once attend to and improve the conservancy in our stations. I have but recently returned from a tour of service of five and a-half years in India, and during that time I did duty in most of our large stations, including Meerut and Lucknow, and I found that though theoretically the system of conservancy may be good, that practically it is, to say the least, very faulty; on examining it one finds that little or no dry earth is used, the receptacles and filth carts are broken and leaky, and the trenches into which the filth is thrown are not attended to. Regulations say that "filth trenches" should be within 300 yards of barracks. That is too close. The great blot in the conservancy of Indian stations is the "French system." These trenches exist for bazaar people, Punkah and Thermantidote coolies, and workmen of all descriptions, and these trenches dotted about all over the station become in the rains simply quagmires of decomposing filth. The native troops have nothing but trenches, and the latter are usually so far from barracks that the men, especially on dark and wet nights, during the rain, will not go so far, but merely visit the nearest nullah. The result need not be described. The bazaars in cantonments are overcrowded to a very great extent, and their sanitation very bad. One point I should like to draw marked attention to is the fact that the sanitary officer is the cantonment magistrate. Nominally, the deputy surgeon-general is the sanitary officer, but his time is too much taken up with other duties, and, practically, the cantonment magistrate, a combatant officer without any special training, is the health or sanitary officer of the station. A medical officer should be specially told off as sanitary officer in our large stations, and then matters would be very different indeed.

Surgeon-Major G. S. ROBINSON (Scots Guards): Typho-malarial fever is a disease worthy of more investigation and of more frequent use. A recent speaker has alluded to its occurrence in American nosology, implying that it does not occur in our own nomenclacture, whereas it has recently been admitted. It occurred very largely in recent Egyptian campaigns, and the name accurately describes its appearance. It does not, however, seem to me a scientific term, as a combination of two specific fevers does not constitute a separate disease. That it differs from ordinary enteric in important respects is undoubted, especially as to prolonged incubation and prolonged convalescence. On the return of troops from Egypt in 1885 several cases occurred three, or even four, months after exposure to the disease. Of course it is difficult to certify that there has not been recent contamination, but several instances occurred where this did not appear to be the case. I believe the fact was noticed at the time by the head of the Statistic Department of the Army. Another point in which the disease differs greatly, is in the occurrence of an intermittent fever in which the temperature is raised two or three degrees every night, after the temperature has come down as in the ordinary enteric. Altogether it seems to me that the exact origin, nature, cause, and treatment are well worthy of more attention from military surgeons, more especially as it does not appear to be recognised as a separate disease by the text-books I have consulted, though so described in our nomenclature.

Dr. GODFREY, United States Marine Hospital Service, rose to refer to the legitimacy of "typho-malarial" as a name. A series of cases observed in the hospital of which I have charge, in which the typhoid fever was interfered with so as to cause suspicion of mixed disease, showed by culture methods and microscopic examination that the patients were all invaded by the bacillus of Eberth and the plasmodum of Lavaran. These patients were all from one place, had drank the same water, and been subjected to the same miasm. In America those places are most exempt from typhoid fever that drink river water held in upper-ground cisterns.

Brigade-Surgeon HENRY S. KEY said that typho-malarial may or may not be a good name, but for the safety of the soldier we shall do well to look at doubtful cases as belonging to the graver (or enteric) form. At Meerut during this year in April and May there were sixteen cases, with nine deaths amongst the troops, besides the cases of two ladies and one officer, all terminating fatally. The ratio of deaths would point to the probability of the disease being true enteric. Now as to prevention. Defective conservancy being one of the known causes of enteric, it must be grappled with sooner or later by Government, as local authority is not sufficient, for want of money. Water being another source, it is of paramount importance to look to wells more carefully. At a hill station of which I have recently been in charge there is an annual outbreak of enteric which in my individual opinion is contracted on the march up from Saharanpore, from water drawn from wells contaminated by natives. Milk has not been referred to during the discussion, but considering it as an undoubted cause, something must be done towards a pure milk supply, and an experiment is now being carried on in Bareilly (where enteric has been for some time prevalent) by the establishment of a dairy farm, the results of which will be watched with interest.

Professor H. CAYLEY said that one of the modes of spread of typhoid fever, cholera, and other diseases, which probably depend on the introduction of a definite poison into the system is by means of the dust carried in the atmosphere. This applies to India and nearly all continental countries. Everywhere in the East the people, as a rule, use the fields and all open spaces as latunes and the whole atmosphere is always more or less pervaded by a fœcal smell, depending chiefly on the presence of actual fœcal matter in the form of dust, which during certain seasons blows up in clouds and pervades everything, contaminates air, food, wells, and sources of drinking water. In India typhoid prevails chiefly in the hot dry months before the rains, and again in the drying-up months after the rainy season. Very probably the present method of dry earth conservancy, instead of open sewers, increases this danger. One other point with regard to the increase of fever of late years. We find now that many more young officers die of fever during their first year of service than was formerly the case, and not because they expose themselves more at outdoor games as lawn tennis, etc., but they die from enteric fever, and in former years—twenty or thirty years ago—there was no such liability to enteric fever among young officers.

Professor NOTTER replied as follows: Brigade-surgeon Staples and myself agree in our conclusions. The figures he gave agree closely with mine. I laid very particular stress on the young and recently-arrived soldier, and especially the latter, which appears to have even a larger influence than the age, and I must leave this to the figures I have placed before you. Surgeon-general Marston asks if diseases depend on a specific cause how are we to prevent it. I answer, by studying the environment of specific cause. Take the cholera bacilli. We know that it will not grow in an acid medium. We know that the stomach is alkaline after fasting, and is, therefore, in a condition to allow the passage of the organism. The practical bearing of this is to use acid drinks, and not to enter a hospital when the stomach is empty. Future research will tell us what are the conditions most favourable to Ebroth's bacilli. I wish again to draw attention to the condition of soil, to the presence of soil heat and soil moisture, and, as a practical conclusion, to say, Dry your soil, and endeavour to control the variation in the water level. I do not think that the cases noted by Brigade-surgeon Harvey are really cases of enteric; the mortality is against it. The fact of natives not suffering is stated as uncertain evidence, and only from hearsay. They were probably not enteric cases, but of a typhoid malarial nature, such as Dr. Godfrey has spoken about. I would draw attention to the defilement of wells by surface washings as being a cause of enteric fever in India, and Dr. Godfrey's experience bears me out in this. I have already, I think, foreshadowed Dr. Cayley's remarks in my paper, and, in conclusion, I beg to state that I fully agree with Dr. Mein in his observations.

Dr. DAVIES replied as follows: I notice that nearly all the speakers appear to endorse the pythogenic theory of origin. I am glad to see this, as it is a justification for my bringing forward and dwelling on the fact that the experience of medical officers in the army is not in accordance with the current teaching as to the necessity of a specific contagion. The main points I desire to emphasise were that some of the most recent bacteriological investigation tends to show that there is not one micro-organism responsible for the causation of enteric fever, but several, differing from each other more or less, though possibly and probably not distinct species, and that this harmonises with the clinical and practical experience of army medical officers, that there is more than one form of fever met wi[illegible]aigns, and described as enteric, typho-malari [illegible] nation suggested being that evolution is the factor that causes these variations. Sir,—This leads me to say a few words on the subject of typho-malarial fever, which has been brought up by several of the later speakers. I agree that the term might be a useful addition to our returns if we can first decide on its definition. At present it is used by different men to describe several distinct morbid conditions. In the nomenclature the Royal College of Physicians places it under the heading of enteric fever, as a variety of enteric fever. My belief is that the term should be restricted to cases of malarial fever which simulate enteric fever by their symptoms. True, enteric fever we know may be modified by a malarial cachexia, especially in the way of prolonging the incubation and protracting the convalescence, but for this no new name is required. The disease is still enteric fever, and if we wish to record its complication with malaria we may call it malarial enteric fever. But when a disease is almost undistinguishable in its symptoms from pathological changes it may be well to use a distinguishing by some separate name. That such a fever exists is proved by my observations at Suakim, as well as by the experience of so many medical officers in India. If we can restrict the term of typho-malarial fever to these cases, by all means let us adopt it, but at present its use without proper definition only serves to increase confusion. I endeavoured to give a clear definition and clinical history of this disease in the *Int. Med. Journal* for April, 1887. If, as I suppose, typho-malarial fever differs from enteric in its cause and in its spread—for typho-malarial fever is not infectious, and enteric is—it is important that these fevers should be differentiated. Do not let us go back to the old idea of an hybrid disease—a new disease produced by the poison of enteric fever, and that of malarial fever. I am glad to have so many endorsements of my contention that camp fever may include conditions imperfectly understood.

The final meeting of this section was held on Friday morning, and a numerous attendance recorded. The presidential chair was taken by Dr. Von Coler (Berlin), who at once introduced the author of the first paper, Dr. V. Logie, who read a paper entitled "Prophylaxie de la Tuberculose Pulmonaire (Mortalité par Phthisie dans l'Armée Belge)," par Dr. V. Logie, Médicin de Regiment au 3me Lanciers, Bruges.

The discussion on Dr. Logie's paper included the following gentlemen, after some preliminary remarks by the President (in German): Dr. Kirchner, Dr. Jules Felix, Dr. Hambleton, and Dr. Meyer.

The proceedings closed by votes of thanks to the President and Officers.

SECTION IX.—STATE HYGIENE.

Professor Pistor (of Berlin), Vice-President of the Section, took the chair.

Administrative Action in Regard to Outbreaks of Infectious Disease.—Notification.

In the absence of the other readers, Dr. Spottiswoode Cameron, Medical Officer of Health, Leeds, was called on by the Chairman to read his paper on "A Limited Outbreak of Typhus Fever in Leeds, which illustrates the advantage of isolation of persons exposed to infection."

Dr. Boobyer, Medical Officer of Health, Nottingham, contributed a paper on "The Compulsory Notification of Infectious Disease."

A paper, entitled "Should Compulsory Notification be Made General?" was read by Mr. D. Biddle. The audience very strongly dissented from parts of this paper.

In the discussion which followed the reading of these three papers,

Dr. Sergeant, M.O.H. County of Lancashire, said he had had a great deal of experience in the working of the Notification Act, and it all went in favour of the value of the Act. He thought dual notification was preferable He commented on the fact that the opposition came not so much from the public as from the medical profession, which was greatly to be regretted. The Act had been adopted voluntarily in 75 per cent. of Lancashire. He objected to the title of "informer" being applied to medical men any more than a vendor of inflammable liquids, who had to notify the fact that he had such on his premises, could be called an informer.

Dr. Hewitt (Minnesota) claimed to represent one of the largest States in America, and there a similar Act had been in force for eight years. It became law at a request of the people. Before this Act was passed, out of a population of 600,000 there were 1,200 deaths from diphtheria per annum. Now (after eight years of the Act) the population was double (nearly a million and a half), and the annual deaths from diphtheria were only 761.

Dr. Parkes (M.O.H., Chelsea) referred to the subject of erysipelas. It was a very indefinite disease. A large number of cases of erysipelas which were not erysipelas at all were represented as such. He thought the notification of this disease did very little good. The only real dangerous form of it was that which occurred after surgical operations, and these cases could not be moved. Another indefinite disease was "continued" fever. He thought the list of diseases required careful revision.

Mr. Shirley Murphy (Medical Officer of Health, County of London) said that a prompt notification of disease was of great value in enabling medical officers of health to ascertain the source and stop the supply of any infected material such as milk. He wished to emphasise the great value of the Notification Act, both for the safety of the public, and also as a means for obtaining material for future investigation.

Dr. Willoughby, of London, would like to ask Mr. Biddle to explain how the notification of disease could possibly hinder measures being taken to prevent its spread?

Dr. Atkinson spoke against dual notification by both doctor and householder, as distinguished from notification by one of these.

Dr. Coventon, of Montreal, gave some facts from his experience in Canada. He spoke at length of the regulations now in force in his province. These worked well and without friction, though they were more stringent there than in many other places. The result was that epidemic diseases were becoming rapidly stamped out.

Mr. Corbet (Kington-on-Thames) read a communication, but could not be heard. He was understood to state that the compulsory notification of disease was an infringement of the personal liberty of the subject.

Dr. Berdoe (District Medical Officer of Bethnal Green) spoke to having seen scarlatina in the homes of the poor, with six to eight families under the same roof, and the parents would not part with their children. Since the Act had come in no friction whatever had occurred. On the contrary, a poor man regarded it as a blessing to have a case of fever in his house, for not only did he get his child looked after at a good hospital, but his house was thoroughly overhauled and put into order.

Dr. Drysdale, Dr. Harvey Littlejohn, Dr. Ewing, (one of the chief medical officers of New York), and others took part in the discussion.

Dr. Cameron, in replying, regretted certain parts of Mr. Biddle's paper, and alluding to that gentleman's statistics, said there was not enough detail as to the existence of fever hospitals, how inspection is carried out, and other particulars which would greatly influence the conclusion. It was also important to examine what diseases were included. Moreover, those statistics were not altogether comparable, because they dealt with different dates. In answering questions he said that typhus fever had frequently occurred in Leeds. His paper illustrated the evil of not notifying, for the Act was not in force in Leeds.

Dr. Boobyer, in replying, mentioned that in the nine years during which notification had been in force scarletina had considerably diminished.

Mr. Biddle said that his chief objection was to the medical man being made the notifier; this work more properly belonged to the householder. He supported the single as against the dual system. He only opposed the dual notification, and his statistics had, he was afraid, been misunderstood.

The meeting was very crowded, and much interest was manifested in the proceedings. Finally the following resolutions were put:—

Proposed by Councillor Dr. Lowe, Leeds, seconded by Dr. Spottiswoode Cameron, Medical Officer of Health of Leeds: "That notification of infectious diseases in all countries should be compulsory." Carried with loud applause, only five voting against.

Proposed by Dr. A. J. Martin, of Paris, seconded by Dr. Tivant, Monaco: "That it is desirable that the notification of infectious maladies should be made by the doctor."

Proposed by Dr. Currie, New Brunswick, seconded by Dr. Fartell, Halifax, Nova Scotia: "That in the opinion of this Section notification of infectious diseases should be made compulsory on the medical attendant and householder in whose house the disease occurs."

Venereal Disease and its Prevention.

On this subject Dr. Birkbeck Nivens, President National (British) Medical Association, for the repeal of the Contagious Diseases Acts, and Mr. J. Holroyde, Medical Officer of Health for Chatham, read papers.

Dr. Routh (of London), Brigade-Surgeon Harvey (of India), and others, contributed to the discussion.

Need for Popular Instruction in Hygiene and Physiology in regard to Health.

There was a special meeting held in the afternoon, at 2.15, Dr. Barry in the chair. A large number of ladies attended, but interest in the proceedings was beginning to flag. A paper was read on "The Teaching of the Laws of Health in Schools" by Dr. Newsholme, and one on "Women's work in promoting the cause of Hygiene," by Miss Margaret Scott. Dr. Wm. Bruce's paper on the same topic was read by Mr. Lithiby, one of the secretaries of the section.

A paper on "The Work of the National Indian Association, especially in Regard to Sanitary Matters," was contributed by Surgeon-General Francis. He insisted that no real hygienic progress would take place in India until the women of India could be educated in the rudiments of health, and he spoke in the highest terms of the Countess of Dufferin's scheme. He advocated the capture of serpents' eggs, for a cobra lays 15 or 20 at a time, and but little good was accomplished by capturing the snakes themselves. Nineteen thousand people were destroyed annually in India by snakes. Unfortunately, the religion and prejudices of the natives often came into collision with elementary hygienic principles, and thus offered considerable opposition to progress.

An interesting paper on "Popular Instruction in Preventive Dentistry" was read by Mr. George Cunningham, of Cambridge. It was illustrated by some beautiful lantern slides.

Mr. Lithiby proposed, and Dr. Barry seconded: "That the cordial thanks of the Section be conveyed to Senor Villanova y Piera, of Madrid, and to Monsieur Guillaume, of Berne, for the valuable works which they have presented to the Congress." This was carried with acclamation.

Mr. Washington Lyon and others continued the discussion on the above papers, and a vote of thanks to the chairman concluded the meeting.

DIVISION II.—DEMOGRAPHY.

The chair was taken at ten a.m. on Friday morning by Dr. Mouat in place of the president, Mr. F. Galton. The meeting was better attended than on any of the previous days.

Dr. Bertillon not being present, Colonel Woodhull (of the United States Army) read a paper prepared by Colonel Charles R. Greenleaf and Major Smart (United States Army) on "Personal Identification by Scars, Marks, etc., Showing Methods of Record in United States Army, and Comparing them with Dr. Bertillon's Method." In the course of his paper he maintained that body marks sufficed to establish identity of an individual apart from measurements by Dr. Bertillon's method. Deserters from the United States army greatly exceed deserters owing to repeaters, but these repeaters are now detected by method adopted at the Surgeon-General's Office, War Department. Colonel Woodhall showed a copy of the register used, and explained how it was kept. The practical working of the new system did not begin until May, 1891. Already there have been 62 cases of suspected fraud, 61 proving real, 26 of 61 being deserters, and 20 ex-convicts.

The President of the section (Mr. F. Galton) then read his paper on the Exhibition of Finger Prints, and of Registers of them as a means of Personal Identification. He demonstrated his method of working, and showed various sets of impressions and photographs of impressions from 300 different persons. Mr. Galton's most recent publication on the subject will be found in the *Nineteenth Century* magazine for this month. The varieties of the patterns of the impressions, and the method of their formation will also be found in the Philosophical Transactions of the Royal Society, 1891. The prints used are those of the bulbs of the ten digits. In size the patterns grow with the individual, and may vary slightly according to the fatness or leanness, etc., of the fingers, but their general character and their structure remain unchanged. The method consists of two stages, (1) classification, (2) attention to minutiæ of the specimens contained in the same class. In (1) the obvious differences in each of the ten fingers are noted. The pattern ranks as a "primary," a] "whorl," or a "loop." Each of these classes is, however, liable to a twofold division, being numbered according to whether the pattern is symmetrical or not. In (2) the scrutiny of individual prints is made by fixing on some well-known minute characteristic and confining attention to that alone. For this purpose a lens must be used. In each finger bulb there are 20 distinct points of reference, hence great accuracy can be obtained and identification rendered easy, and if shown a print could tell whether or not it was identical with a previous print made of the same person.

The Chairman regretted the absence of Dr. Rutillon.

Dr. Wilberforce Smith said in regard to the Bertillon system, measurement in inches not so precise as people imagine; there was a great liability to variation, especially with respect to height. Dr. Wilberforce exhibited a very ingenious machine for taking height accurately. He stated that there were daily variations of an inch—least height at night because of vascular relaxation, greatest in the morning because of muscular tone.

Dr. Mouatt said he found some years ago in India that the method of identification of deserters and criminals by external marks would not work in practice.

Mr. Noble Smith said that measurements by means of tapes were very inaccurate.

Sir Rawson Rawson said the advantage of the Bertillon method lay in the fact that a certain amount of instability was possible without affecting the general accuracy; it was in this that its chief merit lay.

Dr. Bertillon at this moment entered the theatre. He apologised for his late arrival, and proceeded to explain the anthropometrical method of identification of criminals, etc., worked out by his brother, Dr. Alphonse Bertillon—the "Bertillon System." A book on the subject by Dr. Alphonse Bertillon has recently been translated into English. Dr. Bertillon had commenced by saying that the criminal sought to hide his identity; it was to his advantage to do so. Photography alone applied to the establishment of identity would not work, because it was impossible to make a classification. But by his brother's method of measurement of head, etc., and division into groups of great length, medium, and short, a classification could easily be made. The measurement from root of nose to occipital protuberance was a very constant one, and never varied in the same individual.

Dr. GUILLAINE, of Berne, made a few amusing remarks. He thought the system ought to be international—that there ought to be an international bureau; otherwise, if adopted in some countries and not in others, a criminal who meditated a fresh crime would prefer some country where anthropometrical investigations were not carried on.

Colonel WOODHULL said that he did not wish to offer a destructive criticism on the Bertillon method, but in America they had found it unnecessary, and more simple methods did quite as well.

A book of photographs by M. Alphonse Bertillon was exhibited, showing callosities on the fingers of workmen engaged in various trades.

The discussion then terminated.

Dr. John Venn, F.R.S., not being present, his paper on "The Results of Anthropometry at Cambridge" was taken as read.

Dr. FRANCIS WARNER's paper on

THE PHYSICAL CONDITION OF CHILDREN SEEN IN SCHOOLS AND THE LOCAL DISTRIBUTION OF CONDITIONS OF DEFECTIVE DEVELOPMENT

was then read.

A joint committee of the British Medical Association and Charity Organisation Society having undertaken to draw up a report on conditions of child life, to aid the efforts of the State and those of philanthropy, I undertook to examine 50,000 children in schools and to prepare statistics. A brief account of the children is here given; other material is presented in Section IV. of this Congress; a full report will be published.

The physical condition of the child population can only be determined by observation.

The Physical Signs Observed.—The epicanthus, a fold of skin abnormally developed across the inner angle of the opening of the eye-lids, giving an appearance of great width between the eyes.

Frontals overacting.—The frontal muscles produce horizontal creases in the forehead, which may be deep if these muscles overact coarsely; sometimes the muscles are seen working under the skin in vermicular fashion with an athetoid movement; in other cases the action is fine, producing a dull forehead. Such overaction does not necessarily erase expression.

Corrugation. — Knitting the eye-brows, drawing the eye-brows together, vertical creases are thus produced. This may co-exist with frontals overacting.

Orbicularis oculi relaxed.—There is a large thin muscle encircling the eye-lids, its tone gives sharpness of outline to the lower lid so that its convexity is seen; its action is increased in laughter. When this muscle is relaxed there is fulness or bagginess under the eyes.

Hand balance nervous.—Here the wrist is drooped, the palm slightly contracted laterally, the thumb and fingers extended backwards at their junction with the palm.

Hand balance weak.—In this type of balance the wrist is slightly drooped, the palm contracted laterally, and the digits are slightly flexed. In examples of less degree the thumbs only are drooped.

Lordosis.—When the hands are held out an altered balance of the spine may be seen with arching forward in the lumber region, while the upper part between the shoulders is thrown back.

Mental dulness.—In this particular reliance was placed on the teacher's reports. I am not responsible for any mental examination.

Low nutrition was entered against a case if the child were thin or pale (delicate). The children were not examined medically to ascertain the presence of disease, and no information was recorded as to their feeding.

The standard or degree of defectiveness.—In making observations it would be possible to take notes of such cases only as appear to be practically abnormal, describing the facts on which the opinion is grounded. In this inquiry, especially in the schools seen 1890-91, I tried to record all abnormal conditions seen, whether the child appeared to be abnormal or not. The distribution of abnormal conditions, as well as of exceptional children in the schools, was thus determined. It soon became apparent that the conditions of bodily development vary much in different districts, but the cases were not analysed and arranged in groups till the visits to schools were completed, so that I can assure you my mind was not prejudiced in making observations. The date of each visit has been preserved. In many schools I was struck by the corporative absence of defects in the palate, ears, etc., and conversely by the large number of other particular deviations from the normal. When I found this to be the case, I usually reviewed each child in a group to correct or revise my observations. The abnormal child presents a combination of defects. A single abnormal condition of development, as an isolated fact, is not sufficient evidence to indicate the child's brain as probably abnormal, a child may have a narrow palate and be mentally bright. When several defects in development and in brain action co-exist with a report of mental dulness from the teacher, the child is probably "exceptional," especially if its nutrition be low.

For the purpose of demonstrating the local distribution of defects, as far as my notes go, 66 schools, containing—boys, 18,137; girls, 16,854; total, 34,991—are grouped for 20 areas; 12 in London north of Thames, 5 south of Thames, and 3 groups in or around Croydon, Guildford, and Weybridge. From this table it appears probable that certain localities tend to produce a large percentage of certain defects which are less common elsewhere. The poorer districts do not appear necessarily to produce the worst-made children; thus, for five National schools in Kensington and Chelsea defects in development were 12·6 per cent., and for two Board schools in Islington 7·4 per cent. The local circumstances of the groups were not investigated, as not coming within the scope of the present inquiry, but such work appears to be practicable, and it is suggested that exact knowledge as to the local distribution of defects must precede any future attempts to determine their causation, and the possible means of their removal.

The child material in the school and the effects of training.—Educational boards and school managers may be interested in knowing the kind of material the teachers have to work upon, and allowance should be made for this in assessing the results of their labours. The character of institutions varies much in this respect. The need for special training and results thereof are indicated by particular nerve-signs which are frequent in some schools while absent from others. The effects of physical training, or its absence, are always observable, and the personal influence of the teachers may be traced.

Nervous Children.—The "nervous hand balance" or "weak hand," with finger twitching, and lordosis, are the principal signs of what is called nervousness.

Children dull in school work, and pupils irregular in attendance:—

(1.) There is a class of children who on account of their physical condition are unable to comply with the ordinary conditions of school life;

(2.) Mental dulness may be due to low development, or it may be due simply to deficiency of mental faculty, the brain being otherwise sound and well made.

The attempt has thus been made, upon a limited scale, to take a census of the physical condition of samples of the school population; if this is found useful, it could easily be carried out on a large scale. The State has undertaken the education of children, who form one-sixth part of the population, while large numbers who are homeless or helpless have to be provided for. Philanthropy is ever eager to help the children, yet the education of the weaker members, who naturally tend to failure, has never been adequately provided for. It is thought that reasons have been shown for bringing scientific observation to bear upon these questions, which concern the physical and mental status of the nation.

Papers followed on the examination into the condition of the teeth of school children by J. S. Turner and N. B. Paterson, read by Mr. Paterson, and on the physical condition of pauper children boarded out under Local Government Board Orders 1870 and 1889, by Miss Fanny Fowke, read by Miss Hill.

A discussion took place on the three papers taken together.

Dr. Wilberforce Smith, referring to Dr. Warner's paper, said that the methods of examination were undoubtedly highly successful in his (Dr. Warner's) hands, but they would not serve for general use. Such methods in time must pass away. The question was one between personal skill and medical arithmetic, and he preferred the latter. Referring to the paper read by Mr. Paterson, he remarked that he was fully aware of the great importance of the subject, and mentioned a paper he had read before the British Medical Association in 1889 on the early failure of pairs of grinding teeth and one of its leading causes.

Dr. Cunningham said he looked upon the mouth as an incubator, and upon the denture as a machine. The first thing to do was to teach prophylaxis to children, as was pointed out in 1887 by Mr. Fisher, of Dundee. Whether the children's teeth were neglected or not depended on their teachers and not on themselves. He regarded the question as one of the greatest importance to the nation as well as to hygienists and medical men.

Mr. Fletcher Beach, Mr. Peake Richards, and Mr. Knott continued the discussion.

Mr. Ernest Hart expressed his opinion of the great value of Dr. Warner's investigations. People looked with suspicion on investigations undertaken on a physical basis alone, but it was really the method that ought to be supported by the public. He pointed out that these developmental defects were not found solely amongst pauper children, but very often amongst the middle and upper classes.

The readers of the several papers briefly responded.

Mr. Galton then announced that the ordinary business was concluded. He then read the following resolution: "That this Demographical Section thinks it inexpedient, and accordingly declines, to express any opinion upon any question that has not directly arisen out of papers read, nor been formally announced for discussion with a view to a vote being taken upon them."

This was carried by 30 votes to 2.

The President then ruled that M. Vaillant's resolution on the eight hours question was out of order. He then read the following: I have the honour to request the Congress to inscribe on the agenda of the next Congress the following subject for discussion: "The duration of the day's work in relation to the health of the worker, and its consequences on public health."

Signed, Paul Brousse.
Seconded, Adolphe Smith.

This was carried by 17 votes to 3.

The next resolution submitted to the meeting was proposed by Mr. Ernest Hart, and seconded by Mr. Graham Balfour—"That an investigation which has been made in regard to the conditions of bodily development and brain action in some 50,000 children indicates new and grave problems respecting the provisions necessary for the care and training of those who are more or less defective in make, and also respecting the causation, in certain districts, of mal-developments which are much associated with defects of the brain, and that an extended scientific inquiry is desirable for the further elucidation of the subject."

This was carried unanimously.

The last resolution, moved by Dr. von Mayr, and seconded by Professor Guraschek, was as follows:—

The Division of Demography recommends the collection of the following statistical facts, and the development of the same.

A. In those countries where an official insurance of the working classes exists.

I. As regards sick insurance:—

(1) That the insured should be classified by sex, age, conjugal condition, and occupation.

(2) The actual occupation of the insured, his position in such occupation, the length of time he has been in such occupation, and also his previous occupation, should be noted.

(3) The duration of the insurance should be ascertained.

(4) In regard to diseases that terminate fatally, the duration of the disease should be noted, and the time of its appearance as well as the cause of death.

II. Regarding insurance against accidents.—The same data will be required as in the foregoing class, and in addition, a record should be made of the nature, gravity, and consequences of the accident, the time of its occurrence, and the industrial arrangements prevailing when it occurred.

III. Statistics should be given of the wages paid to each workman, and of his hours of labour.

IV. Such statistics should be kept for each branch of industry, and be closed every half-year.

V. The statistics referred to should be prepared in a central office or labour bureau, after consulting the employer and the workman as to the correctness of the same.

B. In those countries where no official insurance of the working class prevails, the same data as above should be furnished.

Public Health.—All communications and letters for Public Health should be addressed to Professor Wynter Blyth, offices of Public Health, Burlington House. Should the journal not be received after order, subscribers are requested to communicate direct with Messrs. Collingridge, 149, Aldersgate Street, E.C.

Visit of the Members to the London School of Medicine.—Yesterday afternoon members of the International Congress of Hygiene were received at the London School of Medicine for Women, by Dr. Elizabeth Blackwell, and Mrs. Thorne, the honorary secretary. The visitors inspected the various class-rooms, laboratories, museums, etc. Refreshments were served in the students' common room. Amongst those present were Mrs. Ernest Hart, Mrs. Scharlieb, M.D., Miss Delamere, L.L.A., Major-General Alexander, C.B., Dr. and Mrs. Waller, Professor and Mrs. Baümber, Mr. and Mrs. Garnett, Dr. Dyer, Dr. Duncan, Dr. Bardach (Odessa), Professor Arloing (Lyons), Dr. Glaister, Surgeon-Major Norton, C. T. Thornton, Esq., C.B., etc., A. C. M. Möller (Amsterdam), John H Gomall (M.O.H., Warrington), Dr. Allworthy, Dr. Kelynack (Manchester), Dr. Freeland (Antigua), Dr. A. Krier (Buda-Pesth), Miss Sarah H[illegible], M.D. (Chicago), Mr. and Mrs. [illegible]

SPECIAL INDIAN MEETING.

THE adjourned meeting for the consideration of questions relating to the sanitary condition of India was held at half-past two p.m., in the Theatre of the London University, Sir MOUNTSTUART GRANT DUFF in the chair. Present: Sir Douglas Galton, K.C.B., Sir Thos. Crauford, K.C.B., Sir W. Moore, K.C.I.E., Sir W. Wedderburn, Bart., Sir Owen Burne, K.C.S.I., Surgeon-General Sir W. J. Moore, Surgeon-General Cornish, C.I.E., Professor Corfield, Brigade-Surgeon Harvey, Mr. T. H. Thornton, C.S.I., Surgeon-General Biddle, C.I.E., Sir Chas. Lawson, Surgeon-Major Hendley, C.I.E., Mr. Dadabhai Naoriji, Mr. E. C. K. Ollivant, C.I.E., Deputy-Surgeon-General W. Farquhar, Mr. K. N. Bahadurji, Mr. Lionel Ashburner, C.S.I., Surgeon-Major McGann, Mr. S. Digby (Honorary Secretary for India), and Mr. Baldwin Latham, M.Inst.C.E.

The PRESIDENT read the following resolution, which had been moved by Sir WM. MOORE: "That looking to the interest shown by India in this Congress, and considering the probability that other tropical countries and colonies would take a similar interest in future Congresses, if a more prominent position were given to the consideration of subjects in which they are specially interested, this meeting recommends to the Permanent Committee that in future Congresses a Tropical Section be formed, with a view to a more full discussion of questions affecting sanitation and the origin of disease in tropical climates."

Sir DOUGLAS GALTON seconded, and it was carried unanimously.

The discussion was then resumed on papers read at a previous meeting by Sir Wm. Moore, Surgeon-Major T. Holbein Hendley, and others.

Surgeon-Major T. HOLBEIN HENDLEY, C.I.E.'s paper was entitled,

PROGRESS OF SANITATION AND PREVENTIVE MEDICINE IN RAJPUTANA.

A by no means flattering picture has been drawn of the unsanitary condition of British India, and it has been shown how formidable the difficulties are which attend any efforts to improve it, but, on turning to the Native States, it will be seen that we are compelled to use yet darker colours in depicting the unsanitary horrors which everywhere abound, and that we have to point out that even still greater troubles beset the path of the sanitarian in those important portions of the empire.

In a typical Rajputana capital the ordinary condition is somewhat as follows: The poorer classes defile the outskirts of the town, the vacant spaces, old buildings, and nearest highways, without the slighest attempt at concealment; the rich inhabitants have private conveniences which are usually so out of repair that the whole house and neighbourhood reeks with foul odours which are painfully indicative of contaminated soil and masonry. There are few drains, and as a rule these are only cleansed during the monsoon season by the storm water. They are so imperfectly constructed that even then much of the sewage escapes into the earth, and in any case, unless there is a running stream close by, it is deposited on adjacent low ground, where it becomes a hotbed of infection, whilst the wells and tanks in the vicinity are of course contaminated. At the close of the rainy months houses and wells in low-lying situations have been frequently proved to have been the starting points for serious epidemics. Most of the occupiers of Indian houses are so careless that they often permit several feet of the drain pipes which run down the outer sides of their dwellings to remain for years in a broken state, so that the sewage, instead of running off into the cesspools or gullies, escapes and saturates the walls. These gullies are narrow passages between the houses which ought to be cleansed every day by the sweepers, but rarely are thoroughly purified until their contents have overflowed for weeks into the streets. No man cares what becomes of filth after it is supposed to have left his own house, and even there it is masked by the use of strong perfumes, and by superficial washings perhaps with coloured water. Draught bullocks and horses are stalled round the open court below the family rooms of the most wealthy citizens. Here the sick are also lodged. Milch kine pick up a living in the streets, and their appetites are so depraved that they act as scavengers At night they live in filthy byres, even below the windows of powerful nobles. Six months ago a friend of my own, one of the principal nobles of Jeypore, complained to me bitterly that he could not keep open the windows of his private rooms on account of the filthy state of an adjacent cow shed. He had no legal remedy, nor had the owner of the cattle against the complainant, who somewhat inconsistently allowed the drainage of his own palace to flow into the street. A few years ago an opportunity was afforded me of showing some of these things to a high official, who, indeed, afterwards became Secretary of State for India. He was horrified to find a sick native gentleman lying in a room next door to the family stables, and immediately asked whether a change for the better could not be made. I proved to him that nothing short of a revolution in the habits of the people and a reconstruction of the city of Jeypore could remedy that evil. The litter from stables and cow-yards, if not eaten by the animals themselves, is used over and over again until it rots. The solid excreta of cattle are turned into fuel, and the liquid escapes into the earth to such a degree that the whole soil becomes highly charged with saline and ammoniacal matter by which the wells are contaminated, and in time their contents rendered undrinkable, so that the city from this cause, and probably from the increasing mortality, has to be abandoned. This explains why almost every great Rajput capital has at least one, but often two, or even more, ancient cities close beside it which are now mere ruins. Jeypore, for example, has its Amber, and Jodhpore its Mundore.

Another reason for the fouling of these wells is the fact that they are usually situated at low points, while the general level of the surrounding soil has been raised by the solid impurities and sweepings which have accumulated to such a degree as to be, in some cases, many feet above the courts and doorways of the houses.

The difficulties attending village sanitation are in many cases much increased by their low situation, which renders them particularly unhealthy after the wet season, On the other hand, they are swept through and through by the life-giving winds which blow so violently during so many months of the year in North India.

The ways of defiling water and food are indeed innumerable. The Brahman washes himself daily as a religious ceremony, but with him, as with too many of his countrymen, or with the Mussullman who in the desert may purify himself with sand, the act is only symbolical, and the washing is, after all, merely a superficial dip in the water, which may be inconceivably filthy, and even that water may be allowed to drip back into the well or on to the well slab on which the traveller prepares his food. From this it is clear that the protection of wells is a most important matter which is, however, too often neglected. There are religious prejudices against cleanliness that even the most advanced persons, and there are many such in India, are almost powerless to resist. I remember the case of an Indian bachelor of medicine, who was ready enough to lecture on the virtues of cleanliness, but who, for several years after its birth, would not allow his own child to be washed, because it had been dedicated to a distant goddess, to whom it must be presented before it had its first bath.

There are innumerable dirty habits, such as expectorating betel on the walls of rooms and staircases, sleeping at night in close, ill-ventilated cells in the clothes worn during the day, or with head and neck enveloped in a filthy cloth, and very many others, all of which are set forth *ad nauseam* by a Bengalee gentleman in a curious little manual which he has published for the benefit of his English-speaking countrymen, and which I need not further describe. Again, there is the family system of living in conjoint households, which brings a great many people together into such intimate relations as must promote insanitation, the accumulation of filth, immorality, and indelicacy, mainly on account of the rigid observance of the laws of purification, which are in brief those of the old Mosaic code as laid down in certain chapters of the book of Leviticus. This touches upon the zenana, which is not so much a question as some suppose of superior delicacy as of what an Indian terms "izzat," or family honour and pride. The zenana, instead of being the most pleasant part of the house, is far too often the least cleanly, the darkest, and most miserable portion of it. Fortunately, much is being done by Lady Dufferin's excellent scheme and other agencies to throw light into these dismal dwellings. In my remarks on Hindus and their houses, I, of course, do not refer to the happy exceptions, which are, alas! as yet far too few.

The sanitarian has to contend with vested interests, particularly of owners of property, of agriculturalists, and of sweepers. The expense of rearranging town habitations to meet modern sanitary requirements would be enormous; so also the construction of drains in villages. No doubt the State should help in many such projects, but progress must of necessity be very gradual in this direction. The native agriculturalist opposes all improvements which cost money or give him extra trouble. He is rarely, if ever, a capitalist, so cannot afford to store up manure or trench it Near the cities the sweeper has hitherto put the manure on the fields at the exact times, and on the exact spots on which the cultivator wanted it, and all the latter had to do was to cover it up and plough it in. No municipality can do as much, and in many parts of India few agriculturalists will undertake to carry the soil themselves, even when it is stored up in convenient depots until wanted. The convenience of both peasant and sweeper has, therefore, until now, led to the storing up of filth in towns themselves until the cultivating season. Much of the natural animal manure is lost by the conversion of it into dried cakes for fuel, owing to the scarcity of wood. The women are engaged for many hours every day in preparing it with their own hands, from which results a further evil, viz., that the poor cannot have clean food as long as their wives are compelled to follow this vile practice. A true sanitary reform is, therefore, the extension of forests with the provision of cheap fuel. Here, however, the agriculturalist gives further trouble by demanding why his grazing rights are restricted, as they necessarily are by forest reservation. On every hand fresh difficulties spring up.

The sweeper holds hereditary office, and sometimes even goes so far as to pawn or sell his rights. In the city of Jeypore there are more than fifteen hundred private sweepers. One man may enjoy the privilege of serving a dozen families in as many different quarters of the town, and so may be compelled to spend the greater part of his time in the waste labour of running from house to house. He will not give up his claim upon a single family, as there are perquisites attached to his office, such as the daily receipt of food, the presentation of clothing on certain occasions, and even of the robes in which the dead are wrapped, a very fertile mode, by the way, of spreading disease, and one which in Jeypore we have tried, but in vain, to mitigate by offering to disinfect all such articles for nothing. The redistribution of these sweepers' walks is one of the greatest troubles our municipalities have to deal with. Some years ago I calculated that the sweepers of Jeypore had never been able to remove more than a fourth of the ordure from the city. I have shown how dogs, cows, Brahmani bulls, swine, peafowl, kites, and vultures do their best with what is left, and if these creatures did not do the work fairly well, life in Indian towns and villages would, perhaps, be impossible. It is said that there are ten thousand pariah dogs in Bikanir, a city of perhaps fifty thousand inhabitants, and yet all earn a living, and look sleek, fat, and strong. In the absence of a scientific sanitary system nothing could replace them. All this shows how very careful we must be in interfering with what would appear truly to be natural compensations. For example, with the hyperlactation of children who are nursed by their mothers long after they can run about, or with the boiling of milk, which is universal, as it is, perhaps, to these two practices that we owe the fact that there are in India any children who survive infancy. Nearly all the milk comes from foul-feeding cattle. We are not even sure that the universal use of opium for children is wholly injurious; at all events, to enforce mothers to give it up in Rajputana would cause a rebellion.

The result of all these terrible evils is so great that some physicians have gone so far as to declare that we rarely see a case of enteric fever in a native adult because almost every child who survives has suffered from it in early life. I may observe here that the baids, hakims, and other practitioners of the indigenous medical systems have done nothing in the way of preventive medicine or of sanitary improvement. In carrying out important sanitary projects we must be very careful how we proceed, as failure on a large scale alarms the people and hinders progress. Within my own experience I have known of the bursting of one large reservoir, the failure of another on account of leakage, the subsidence of the water level and the diminution of the water supply in a whole district, and the breakage of the embankment of a huge artificial lake—all from defective engineering and want of appreciation of the difficulties attending such undertakings. It is in vaccination, perhaps, that our greatest trials have arisen. Ignorance and prejudice have attributed deaths from disease to the operation itself; our objects have been misrepresented; it has been stated that we are in search of the Imam Mahdi of the Musalmans, who is said to have milk in his veins; or of the Kalki Avatara of Vishnu, who bears marks which doctors would recognise, either of which powerful beings would put an end to British rule; and last, but not least, anti-vaccinationists have appeared even on the edge of the desert in the persons of rich traders returning home from Calcutta, where they have learned the most refined and most modern forms of obstruction. I am inclined, however, to believe with Rao Bahadur Kanti Chander Mookerjee, the able and enlightened minister of Jeypore, that until we can secure a higher class of subordinate officials than at present exists in Rajputana, we shall not be able to carry out really important improvements. The men are ill-paid, though as well paid, perhaps, as their merits demand, as they are full of prejudices, very ignorant, and too often look upon taking bribes as innocent, an opinion which is quite in accord with that of the general public, who regard the offering of bribes as also free from blame.

The author next detailed the considerable advances in sanitary administration in Rajputana, the province which he represented at the Congress.

The water supply of Jeypore, the registration of births and deaths, the improvement of the jails in Native States, were favourably commented upon. The author continued,

In the past, complaints of private individuals regarding nuisances were rarely attended to. Now all municipalities and health authorities make efforts to abate them, and, in consequence of the general improvement of government in many of the Rajput Native States, there is an increasing readiness to make such applications, and to believe that the laws will be applied to all classes alike. Very much, however, has still to be done under this head. Some effort is being made, especially in Jeypore, to raise up a more educated class of officials, and the elements of sanitation are being taught in the schools and colleges. The young nobles at the Rajput College at Ajmere are not forgotten in this respect. In Jeypore I have circulated and posted up in many public places brief rules for the management of accidents and sanitary regulations, in the hope that good may be done. Similar efforts have been made in other States, and special means are adopted to prevent the spread of epidemics by distributing medicines, and by attending to the sanitation of fairs and other large gatherings. Surgeon General Cunningham's Sanitary Primer has been used in many of our educational institutions, and a more advanced treatise has been issued by the Government of India for the use of students in the higher classes, but my own experience leads me to believe that, for a long time to come, Dr. Cunningham's valuable work will prove almost too difficult for the blank state of the ordinary Hindu mind on this subject. As example is better than precept, I may point to that set by many native princes and enlightened citizens. The Palace of Jeypore is a perfect paradise to what it was when I knew it first, some seventeen years ago. H.H. the Maharaja, the present owner, who is extremely liberal in all that concerns the health of his people, once hit the right nail on the head when he told me that he could only secure cleanliness by frequently moving his quarters from one set of rooms to another. Constant inspection by good officials is the secret of success. Unsanitary trades still flourish within town limits, and can only be dealt with very gradually. The horrors attending native childbirth are well known. We are starting a school for teaching the dhais, or native midwives, the elements of good management in such cases. I may note that educated native gentlemen, who are fathers, are now frequently found studying the useful manuals of Dr. Murdoch Smith, of Madras, on this and kindred subjects.

I wish I could speak favourably of the progress of sanitation in our villages. We publish only the most simple rules, as, for example, that all manure should be placed on the leeward side of the village, that the wells and the ground for a few yards round them should be kept clean, that well parapets should be raised, that one water source should be reserved for drinking purposes, and that the people should be compelled to go a certain distance outside the village for natural purposes. So far little or nothing has been done, and for the reasons I have clearly indicated, yet I am sure it will be dangerous to use pressure. We must proceed slowly and with great tact, and always on the same lines, so that the evils attending change of officials may be minimised as much as possible. For this purpose it is wise to print full reports, so that the work done one year by one man may not be undone the next by his successor.

Brigade-Surgeon HARVEY (delegate of the Government of India) said that the Government is thoroughly alive to the importance of sanitary matters in India, but the great drawbacks which they had to contend with were the native ignorance and prejudice and want of funds—the natives consider that what was good enough for their fathers is good enough for them; the cry that caste is in danger whenever any innovation is tried; and that it would not be until the natives were educated in sanitary matters that any real progress would be made. He further said that the needs of India were enormous, and crowds of applications besiege the Government on all sides for contributions towards most urgent matters, so that very little money is left to be applied to the advancement of sanitation.

Mr. THORNTON (late Secretary to the Government of the Punjaub) spoke, among other matters, upon the insanitary condition of the prisons in India, and suggested that they should be constructed on the separate cellular system as in Britain. He said that the high mortality of the Indian jails is most deplorable, and that the Government objected to the cellular system on the ground that the prisoners would be simply baked in the cells in a hot climate like that of India, but he was inclined to think that the objection on their part was more a question of money. He instanced a case where such a system had been introduced into the prison of a native State in the hottest part of the country and with most satisfactory results. He expressed an opinion that if the principal towns were put into a proper sanitary state the villages would by example soon improve in their condition.

Dr. MAORIJI said that he had only one suggestion to

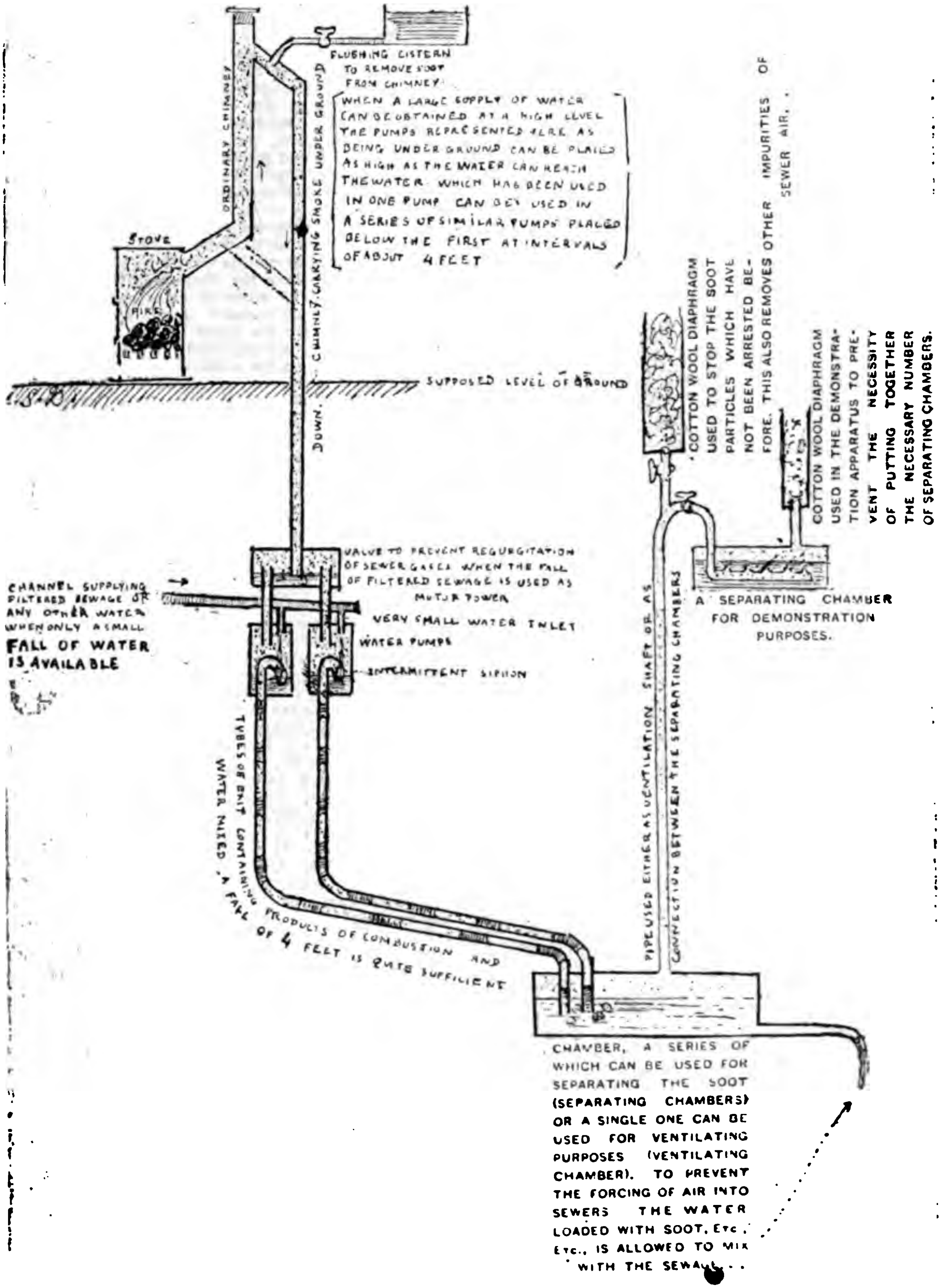
A paper was read by Dr. FERNANDO on "The Sanitation of Ceylon,"

After which a vote of thanks was carried with acclamation to Sir Mount Stewart Grant-Duff for presiding.

DR. DELEPINE'S APPARATUS FOR REMOVING SMOKE, AND OF USING IT FOR THE DISINFECTION OF SEWAGE.

DR. DELEPINE believes that the noxious effects of the town fogs are due to the presence of the products of combustion. These consist not only of solid matter, such as soot, but also of gaseous products, such as sulphurous acid. The complete combustion of fuel, or the consumption of smoke does not remove the latter, nor does it take away other objectionable gases. If the air of towns could be deprived entirely of the products of combustion, it would be greatly improved. The apparatus is composed essentially of a water pump, by the action of which the products of combustion are made to pass into a descending flue, properly guarded by a water valve in order to prevent regurgitation of gases. The pump is not unlike an ordinary water pump, but differs from one in that the exit is an intermittent syphon, so that although the tube of exit is a large one, and allows much air to escape, the amount of water supplied need not be great. This apparatus was introduced by Dr. Delépine, because he found that Bunsen's pump did not act well. A fall of four feet is sufficient for the mixture of smoke and water, running through the exit tubes of the pump, and made to bubble through a series of washing chambers, where the soot and soluble products are retained. The pressure of water supplied to the pump need not be more than a few inches. The motor power may be derived from the fall of sewage itself after filtration. In this way the sewage would act as a motor power and, at the same time, be more or less completely disinfected, and its value as a manure would at the same time be increased. With the assistance of Mr. Gomess, Dr. Delépine is now investigating the use of the apparatus in order to find out whether the system is one which could be used with advantage on a large scale. We are indebted to Dr. Delepine for the diagram given in the next page. It was drawn to show how he proposes to use the products of combustion for the disinfection of sewage. The supporting parts of the apparatus are not shown. The smoke is represented by dots.

TO MEMBERS OF THE CONGRESS.—The seventh International Hygienic Congress is over, and although our reports have been as full as possible, we have necessarily omitted much valuable matter. Some of the papers which were sent in late were not printed, and we have not in all cases been able to get full reports. We, therefore, ask those members whose contributions have not been fully reported to send in their papers to PUBLIC HEALTH, which will in future appear as usual as a monthly journal of hygiene. All communications should now be addressed to the Editor, The Court House, St. Marylebone, W.


FLUSHING CISTERN TO REMOVE SOOT FROM CHIMNEY.
WHEN A LARGE SUPPLY OF WATER CAN BE OBTAINED AT A HIGH LEVEL THE PUMPS REPRESENTED HERE AS BEING UNDERGROUND CAN BE PLACED AS HIGH AS THE WATER CAN REACH THE WATER WHICH HAS BEEN USED IN ONE PUMP CAN BE USED IN A SERIES OF SIMILAR PUMPS PLACED BELOW THE FIRST AT INTERVALS OF ABOUT 4 FEET
ORDINARY CHIMNEY
STOVE
FIRE
CHIMNEY CARRYING SMOKE UNDER GROUND
DOWN.
SUPPOSED LEVEL OF GROUND
VALVE TO PREVENT REGURGITATION OF SEWER GASES WHEN THE FALL OF FILTERED SEWAGE IS USED AS MOTOR POWER
CHANNEL SUPPLYING FILTERED SEWAGE OR ANY OTHER WATER WHEN ONLY A SMALL FALL OF WATER IS AVAILABLE
VERY SMALL WATER INLET
WATER PUMPS
INTERMITTENT SIPHON
TUBES OF BUILT CONTAINING PRODUCTS OF COMBUSTION AND WATER MIXED, A FALL OF 4 FEET IS QUITE SUFFICIENT
PIPE USED EITHER AS VENTILATION SHAFT OR AS CONNECTION BETWEEN THE SEPARATING CHAMBERS
COTTON WOOL DIAPHRAGM USED TO STOP THE SOOT PARTICLES WHICH HAVE NOT BEEN ARRESTED BEFORE. THIS ALSO REMOVES OTHER IMPURITIES OF SEWER AIR.
COTTON WOOL DIAPHRAGM USED IN THE DEMONSTRATION APPARATUS TO PREVENT THE NECESSITY OF PUTTING TOGETHER THE NECESSARY NUMBER OF SEPARATING CHAMBERS.
A SEPARATING CHAMBER FOR DEMONSTRATION PURPOSES.
CHAMBER, A SERIES OF WHICH CAN BE USED FOR SEPARATING THE SOOT (SEPARATING CHAMBERS) OR A SINGLE ONE CAN BE USED FOR VENTILATING PURPOSES (VENTILATING CHAMBER). TO PREVENT THE FORCING OF AIR INTO SEWERS THE WATER LOADED WITH SOOT, ETC., ETC., IS ALLOWED TO MIX WITH THE SEWAGE.

DR. DELÉPINE'S APPARATUS FOR REMOVING THE PRODUCTS OF COMBUSTION AND MIXING THEM WITH SEWAGE.

THE LADIES' COMMITTEE.

The following notes have been kindly sent by a lady contributor:—

The ladies who have joined the Hygienic Congress are really in clover—never have they at any meeting of the kind been so well treated or so much considered. Quite close to Burlington House, where the Sections meet and papers are read and discussed, there is an oasis prepared expressly for them in some beautiful galleries in Old Bond Street. There they not only rest on comfortable chairs and couches, but they can partake of fragrant tea, delicious coffee, fruit, and ices, and hear all the news of the Congress from other ladies. This section of the Congress is presided over by Mrs. Priestley, assisted by Miss Lankester, of the National Health Society, and most thoroughly have they carried out all they undertook. Both these ladies speak French and German with ease, and most of the foreigners who come to these rooms to make inquiries understand one of these languages, even should they hail from Finland or from Turkey, as some of them do. It is a great pleasure and privilege, too, for the tired devotees of hygiene and demography to refresh their wearied spirits by seeing all around them on the walls of the fine gallery in which they rest a collection of pictures such as is seldom to be met with. Amongst the most attractive paintings there are several by the late Keeley Halswelle, R.A.; Briton Riviere's "Pale Cynthia"; "The Nest," by Sir John Millais; "Tempest Tossed," by Peter Graham; "The Harvest Moon," by Boughton; "The Wold of Surrey," by Vicat Cole, R.A., and others; whilst at the end of the room hangs a beautiful "portrait of Lady Helen Vincent," by Edward Hughes. Below, in the well-known smaller galleries, there is Alma Tadema's "Earthly Paradise," and "A Mighty Hunter before the Lord," by Briton Riviere. This latter picture was in this year's Academy, and very affecting it is to all lovers of animals to see the "Monarchs of the Forest," the noble lion and lioness, at the mercy of the man who seeks them out in their lair but to destroy. The ladies who act as attentive hostesses in this reception room are ever on the alert to help and to guide strangers and foreigners, and to suggest how they can best see all that London has to show, and they are aided by the services of two lady guides, who are excellent specimens of the value of this corps of lady workers, and are ready at any moment to conduct a party of ladies wheresoever they will; indeed, gentlemen are frequently included in the pleasant expeditions to Windsor, Crystal Palace, Buckingham Palace, Grosvenor House, or other available places. Gentlemen are welcomed to the pleasant quarters in Old Bond Street if they can excuse their presence by claiming acquaintance with one of the ladies of the Committee, and a distinguished physician was heard to declare, whilst sipping a cup of tea, that this of all the sections was most delightful, and well managed, as is in truth the case, for the members of the Reception Committee have worked harmoniously together, without one single difference of opinion from beginning to end. At ten o'clock each morning since the Congress opened, three omnibuses wait outside the reception room to take parties of ladies to various places of interest, accompanied by one of the ladies of the Reception Committee, who thus give their time and energies to promote the pleasure of their English and foreign guests, who warmly appreciate the attention shown them.

Mrs. Priestley gave a successful soirée in the ladies' reception rooms on Wednesday evening, and whilst the lords of creation were enjoying themselves at the College of Physicians their wives and daughters were perhaps more charmingly entertained in Messrs. Agnew's Gallery, where they were listening to the strains of sweet music, most kindly provided for their delectation, so that art in at least two forms here waited on science. Miss Carlotta Elliott gave some English and German songs, accompanied by Signor Romili, and Miss Lilian Tarbotton played on the violin. When the gentlemen turned in from their conversazione at the College of Physicians, ostensibly for their feminine belongings, headed by Sir Spencer Wells, the Chairman of the Reception Committee, the scene became very gay, for every graduate of a university wore his academic gown, with its appropriate crimson, white, or scarlet hood and facings, and both ladies and gentlemen donned for the occasion their respective orders or decorations—the little enamelled white shield and red cross of the National Health Society being conspicuously worn, in company with the small gilt badge of the Congress, and in some instances side by side with the Order of St. John of Jerusalem. During the evening the conversation was decidedly polyglot, and the fluency with which the English ladies on the committee conversed with those of other nations was really surprising. The "Froken" from Finland seemed thoroughly to enjoy the general babel, for great pains was taken by the accomplished lady managers to show them the pictures on the walls, and to explain all they saw and heard in this respect, and in all matters of personal attention the lady members of the Congress have had many more advantages than those of their learned and scientific husbands and friends, and as this is so seldom the case they must all feel the more pleased and satisfied.

CRYSTAL PALACE DINNER.

On Thursday evening some 500 members of the Congress made their way to the Crystal Palace, the gentler sex on this occasion, as in most of the other social functions, forming a very large proportion of the company. A special saloon train started from Victoria and was insufficient for the large numbers wishing to travel by it. On arriving at the Palace, it was evident that the Congress members formed only a very small proportion of the total assemblage; as there must have been over a thousand children watching a variety performance which was proceeding. So far as the dinner is concerned, the less said the better. The arrangements were chaotic, and it might be more correctly said that no proper arrangements were made for the reception and comfort of the visitors. The dinner turned out to be a cold collation, the waiting was most insufficient, the result being that everyone had to help himself, and at some tables it almost degenerated into a scramble for food. We do not know who is responsible for the defective character of this dinner, but the result cannot be said to do honour to the Congress. Almost before dinner was over, a considerable proportion of the visitors was smoking, notwithstanding the presence of ladies. No special arrangement was made to secure that the members of the Congress should have a good view of the fireworks, and each one had to take his chance among the thousands of other visitors. Notwithstanding this imperfection of arrangements, the display of fireworks was excellent, and was evidently highly appreciated by the numerous visitors. It was, however, unfortunate that in connection with an International Congress the battle of the Nile should be pyrotechnically exhibited. We do not know what our French visitors would think of the unbroken Union Jack flag and the tattered Tricolor, but we hope that the national aspect of the illustration would escape their notice. The ordinary return train arrangements were lamentably defective. Visitors who left the Palace at ten p.m. did not reach Victoria until nearly eleven o'clock, though the special train was fairly prompt.

The closing meeting of the International Congress of Hygiene and Demography of 1891 will be held in the Theatre of the London University on Monday, August 17th, 1891, at eleven o'clock forenoon.

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(*For Continuation see next Page.*)

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(*Continued from preceding Page*).

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They are made in **three** forms **A, B,** and **C,** to secure efficient **sewerage** and **drainage** at the **lowest cost.**

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However carefully **ordinary socket pipes** are laid, it is practically impossible to maintain them in true line. The sockets are **concentric** with the pipe, and the large annular space allows the spigots ***to drop,*** *which* **lowers the invert** at the joints of the pipes, and the **ledges** thus formed **check**

the flow of the sewage and **hold the solid matter**, where it gradually accumulates, and eventually **stops the drain** which soon becomes a mere **UNDERGROUND CESSPOOL**, exceedingly **OFFENSIVE** and **DANGEROUS TO HEALTH**.

Mr. JOHN PHILLIPS, C.E., in his "**Drainage and Sewerage of Towns**," in reference to the **ordinary socket pipes**, says :—"Owing to the short lengths of the pipes, irregularity of shape, and multiplication of joints, they are often laid in undulations instead of to regular inclination ; and owing to the **large size and irregular form of the sockets, the diameters of which are much greater than those of the butt ends** there are protuberances which check the sewage current, and cause hair, paper, rags, and other things to catch the joints, fœcal matter to deposit, and the drain or sewer to stop up. Hence, through the joints both sewage and sewage gases constantly escape, so that while the sewage sinks into and saturates the ground beneath, the gases emanating from it rise through the permeable ground above and issue through the chinks of the flooring into the houses, the heat of which promotes the draught, and this is what really takes place, more or less, from every line of pipes as now put down."

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Nuisance and **danger to health** from **stagnant sewage** and **foul gases** is minimised ; as the drains, being free from obstruction, the **solids** are carried to the **outfall** before **decomposition,** and the **ventilation** of the sewers is thus more easily effected.

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THE "ST. BEDE DISINFECTANT,"

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TESTIMONIALS.

Report by Dr. EDWARD SEATON, on the "St. Bede Disinfectant."

July 31st, 1889.

Since it became established that the Per-Chloride of Mercury in the presence of a free acid, or its equivalent, was by far the most efficacious disinfectant; medical practitioners generally, and especially those who have to do with the prevention of fevers, have felt the great want of a convenient preparation which would contain the Per-Chloride of Mercury in the necessary strength together with a free acid, or its equivalent; and which would at the same time be in such a form as could be safely entrusted to fever nurses, sanitary inspectors and others by whom the processes of disinfection are usually carried out.

Such an article has now been prepared by the St. Bede Chemical Company. It is in the form of blocks, each weighing an ounce, and each containing 17·5 grains, or 4 per cent. of Per-Chloride of Mercury. The block is composed mainly of anhydrous sodium sulphate (392·4 grains) with which is combined 24·5 grains of sulphuric acid; the acid sulphate thus formed appearing to act like a free acid, and to give to the Per-Chloride of Mercury its full disinfecting or germ-destroying power. The block contains also 2·2 grains of eucalyptus and thymol and ·9 grains of indigo, so that when dissolved it has a strong, but pleasant, smell and a bright blue colour. I have had several of these blocks submitted to me for analysis, experiment and report. I find the proportion of the Per-Chloride of Mercury in each to be as stated, viz., 4 per cent., or 17 grains in the ounce block. The block is rather slowly soluble in a quart of water. The resulting blue solution is described as a very strong disinfectant. In order to test this I have made experiments in conjunction with Dr. Klein, to ascertain the effect of the solution on certain well-known organisms which have proved to be pathogenic or constantly present in symotic diseases. The tests were made with the bacilli and spores of anthrax, also with the organisms present in cases of cholera and enteric fever. On adding three drops of the culture fluids of these organisms to three cubic centimetres of the blue solution consisting of one block dissolved in a quart of water, the organisms were destroyed after only five minutes exposure. This is a very severe test and shows that the blue solution is a very strong disinfectant for infected linen, blankets &c. We further tested its power of disinfecting the evacuations of enteric fever and cholera. Sterilised fœcal matter in a fluid condition was inoculated with as much as one-seventh part of the culture fluid of the organisms present in enteric fever. To this was added an equal quantity of the blue solution, and five minutes was found to be sufficient to destroy the organisms. I have also tested its antiseptic powers by dissolving blocks in putrescible fluids, and I found that one block dissolved in twenty-five quarts of a putrescible fluid, retarded decomposition five days; and that when dissolved in twelve and a-half quarts, there was no sign of decomposition in the putrescible fluid after eight days. I further tested its power as a deodorant by noticing its effect upon heaps of fish refuse mixed with other decomposing animal and vegetable matters, and I found the solution was an excellent deodorant.

The preparation called the "St. Bede Disinfectant" has most powerful disinfecting and antiseptic properties, and is also a valuable deodorant. At the same time its colour and smell are quite sufficient safeguards against the possibility of its mistaken use. I have therefore no hesitation in strongly recommending it on public grounds.

(Signed) EDWARD SEATON, M.D., F.R.C.P.,
Fellow of the Institute of Chemistry, Medical Officer of Health for Chelsea, Lecturer on Sanitary Science and Public Health, St. Thomas's Hospital, London.

The details of the Experiments referred to in Dr. Seaton's Report are as follows —

The "St. Bede Disinfectant" was now in solution, one block being dissolved in one quart of water.

1. The "killing power," *i.e.*, the power to kill microbes, was tested on the following microbes: (*a*) bacillus anthracis without spores, (*b*) spores of bacillus anthracis, (*c*) the comma-bacillus found in Asiatic cholera, (*d*) the bacillus found in human typhoid fever.

Of normal cultivations in broth of these several microbes about three drops were added to about three cubic centimetres of the disinfectant solution, well mixed and after the lapse of five minutes, one or two drops of the mixture were added to tubes containing about 10 c.c. normal sterile beef broth; for control similar normal sterile beef broth was inoculated with a mere trace of the same culture fluids used for the above experiments. All broth tubes were placed in the incubator at 37° C., while all the control tubes showed already after 24 hours' copious typical growth of the several microbes, the others were perfectly clear and remained so afterwards. It follows from these experiments that five minutes' exposure of bacillus anthracis, of spores of bacillus anthracis, of the choleraic bacilli, and of the typhoid fever bacilli to the "St. Bede Disinfectant" solution is sufficient to kill these microbes.

2. An important and extremely severe test of the killing power of the "St. Bede Disinfectant" solution was made in the following experiments :—

To normal human fœcal matter in thick solution previously sterilised and contained in test tubes was added a certain quantity of normal culture fluid of the choleraic bacilli and of the typhoid fever bacilli respectively, about one-seventh of the culture fluid being added to six-sevenths of the fœcal solution. After mixing well the disinfectant was added to each of the fœcal mixtures in equal proportions, so that each of the test tubes contained ½ of the fœcal matter plus culture fluid, and ½ of the disinfectant. After five minutes a number of test tubes containing sterile beef broth, as in the former series, were inoculated with a drop or two from these fœcal mixture tubes, then placed in the incubator and kept at 37° C.; but no growth appeared in them and the fluids remained sterile. At the same time that the above experiments were made, control broth tubes were inoculated with a trace of the fœcal solution after the addition to them of the culture fluids, but before the addition of the disinfectant these control tubes were also placed in the incubator and kept at 37° C., they all showed abundant normal growth after 24 hours of the choleraic bacilli and of the typhoid bacilli respectively.

(Signed) E. KLEIN, M.D., F.R.S.,
Professor of Bacteriology at the College of State Medicine, London.

Laboratory and Assay Office,
75, The Side, Newcastle-upon-Tyne,
July 6th, 1889.

I hereby certify that I have analysed a sample of the "St. Bede Disinfectant," manufactured by Messrs. The St. Bede Chemical Company (Limited) Newcastle-upon-Tyne, and that I find it contains as follows :—

Per-Chloride of Mercury	4·01	per cent.
Free Sulphuric Acid	4·10	"
Sulphate of Soda	87·25	"
Sulphate of Lime	1·30	"
Oxide of Iron, &c.	0·27	"
Chloride of Sodium	0·[illegible]1	"
Insoluble Siliceous Matter	[illegible]	"
Thymol, Eucalyptus, Indigo, and Water ...	[illegible]·62	"
	100·00	

The principal active ingredient of this disinfectant is Per-Chloride of Mercury (corrosive sublimate) which is known to be the most certain and powerful destroyer of disease germs. When the "St. Bede Disinfectant" is dissolved according to the instructions given it forms a solution of the strength and character recommended by Dr. Buchanan, the Medical Officer of the Local Government Board, as being effective as a disinfectant. It is prepared and packed in a form which makes it convenient and easy to be used.

(Signed) JOHN PATTINSON, F.I.C., F.C.S.,
Public Analyst for Newcastle-upon-Tyne

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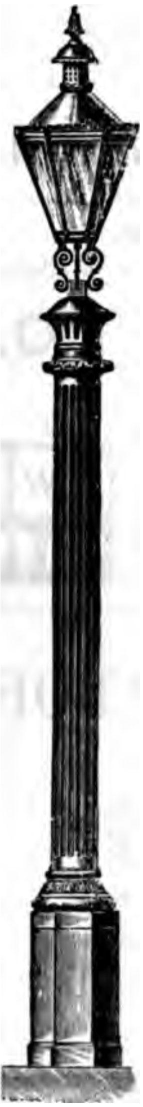

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Referring to **Holman-Keeling's Patent Sewer Gas Destructors**, the best testimonial I can give is simply to state the fact that we erected *Two* as an experiment in 1887; *Five* more in the following year; subsequently we made the number up to *Twelve*, and are now about to erect *Three* others. This will make the number *Fifteen* up to date.

Charles Jones, A.M.Inst.C.E., Engineer and Surveyor, Ealing.

We have had **Keeling-Holman's Sewer Gas Exhausters and Destructors** in continuous use in this district during the last three years. We have discontinued the use of open sewer gratings in the streets, and sewer ventilating pipes on the roofs of houses, preferring, in the interest of the public health, to destroy all foul and noxious sewer gases, by causing them to pass through a destructive heat. We have nine in use, and shall erect others on the new sewers in course of construction. Walter Brooke, A.M.I.C.E., Borough Surveyor, Richmond. 5th November, 1890.

SECOND TESTIMONIAL AFTER THREE YEARS' WORKING.

We have 17 Destructors distributed over the city, acting upon approximately 20 miles of Sewers, and as they are in constant action, I have no anxiety from the fear of Sewers getting foul in any kind of weather.

Wm. Gamon, City Surveyor, Winchester. 11th November, 1890.

TESTIMONIAL AFTER ONE AND A HALF YEARS' WORKING.

I have pleasure in stating that the Destructor which you supplied last year has been in operation ever since, and continues to work to my entire satisfaction. Arthur Salmon, Surveyor, Wallasey Local Board. 21st November, 1890.

Extract from an account of "SOME OF THE PUBLIC WORKS OF CROYDON," by THOMAS WALKER, M.Inst.C.E., Borough Engineer, Croydon, 1890.

"We have allowed all comers to try anything that an inventive age could suggest, most of them not worth a moment's consideration. One of **Keeling's Destructors** has been well tried, with results far better than any other." Dr. Rowland's yearly report of health and sanitary condition of Richmond for the year ending December, 1888, contains the following tabular statement:—Deaths from five zymotic diseases. 1886: Measles, 9, Scarlet Fever, 1, Diphtheria, 3, Typhoid Fever, 7, Diarrhœa, 7, total, 27. 1887: Measles, 6, Scarlet Fever, 0, Diphtheria, 1, Typhoid Fever, 7, Diarrhœa, 6, total, 20. 1888: Measles, 5, Scarlet Fever, 0, Diphtheria, 0, Typhoid Fever, 3, Diarrhœa, 4, total, 12. Dr. Patten, Medical Officer of Health at Ealing, reports a low death-rate of 10·6 per 1,000 for 1889, and in his report he states that several additional **Keeling's Sewer Gas Destructors** were in operation during the greater part of the year.

The Sanitary Authority of Richmond passed the following Resolution, under date Dec. 3rd, 1889:

"That Mr. Holman be informed that the Vestry have great pleasure in bearing testimony to the success of **Keeling's Sewer Gas Destructors** as improved by him, and in thanking him for the time and expense he has devoted to the matter."

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Blackpool.
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Castleford.
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Crewe.
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Darlington.
Dublin (Barracks).
Ealing.
Eastbourne.
East Dereham.
Egremont.
Epsom.
Hammersmith.
Hendon.
Leicester.
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Melbourne.
Nottingham.
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Portsmouth.
Putney.
Richmond.
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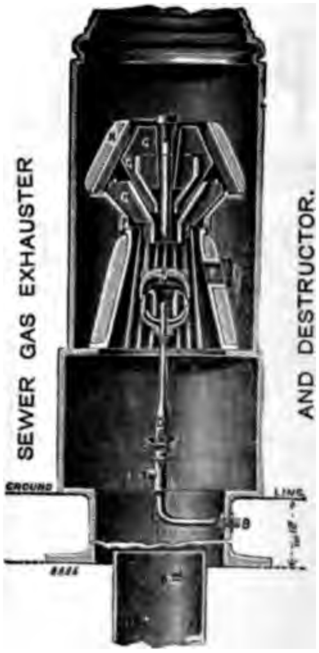
Enlarged Section of Base of Column, showing Furnace.



One 4 in. Keeling's Sewer Gas Destructor, consuming only 6 cubic feet of coal gas per hour, will exhaust and subject to a destructive heat 40,000 cubic feet of sewer gas, at a cost of 4½d. per day of twenty-four hours.

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pass 3,000 cubic feet of heated air per hour, by a consumption of 6 cubic feet of gas per hour, costing 2d. per day of ten hours. The FURNACES of the above are also eminently adapted to ventilate the Wards of Hospitals, Asylums, and other public buildings.

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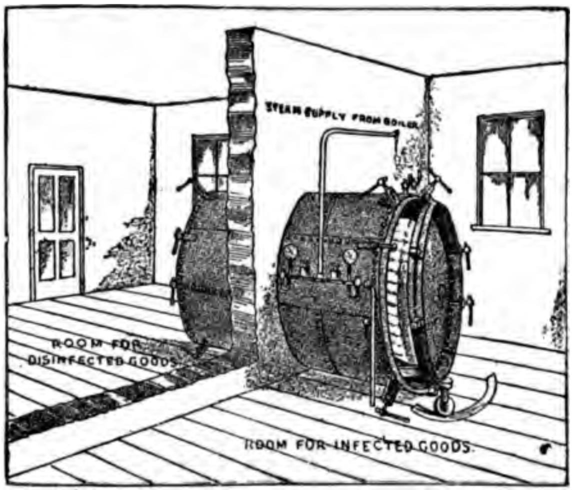
GOLD MEDAL, International Health Exhibition, London, 1884.



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DR. KLEIN selected for his experiments a highly infectious disease, namely, Swine Fever, and says:—

"Having, then, a disease of animals which can be easily produced, and which is highly infectious, by the air, it was "seen to be fitted for the desired object of ascertaining experimentally by which gaseous substances such infection by the "air could be prevented: that is to say, by which gaseous substances the contagion can be neutralised."

After details of the experiments, he proceeds:—

"We see, then, from these experiments, that a healthy animal was with safety placed in the same compartment with a "diseased animal, even for so long a time as six hours, for five successive days, provided the air in the compartment "remained well fumigated with **Chlorine** gas. Twice well fumigated up to marked pungency during the six hours "being sufficient."

After details of further experiments, he adds:—

"We see, then, that one good fumigation by **Chlorine** availed to neutralise effectually the virus in a compartment "from which a diseased animal had been removed."

DR. WYNTER BLYTH in a Paper read before the Society of Medical Officers of Health, in March, 1885, said:—

"I consider that the best and most efficient way to disinfect a room after disease is to make it, as much as possible, "like a hermetically-sealed box, and in this box to evolve **Chlorine**: 3 lbs. of chloride of lime and 3 lbs. of hydrochloric "acid* being used for every 1000 cubic feet of space."

*Vinegar or any other acid will evolve the Chlorine quite as well as hydrochloric acid; the latter was named by Dr. BLYTH doubtless because it was easily procurable and cheap at the place where he was speaking.

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Bichloride of Mercury in solution in the proportion of 1 in 10,000 is a reliable agent for the destruction of micro-cocci and bacilli in active growth not containing spores; and in the proportion of 1 in 1,000 it destroys the spores of the bacilli, provided that the micro-organisms are exposed for a sufficient length of time.

A solution of 1 in 1,000 can be safely recommended for the disinfection of bedding and clothing which can be washed, for washing floors and walls of infected apartments, for disinfecting the hands and instruments of surgeons and gynocologists, and as a disinfecting wash for superficial wounds or mucous surfaces.

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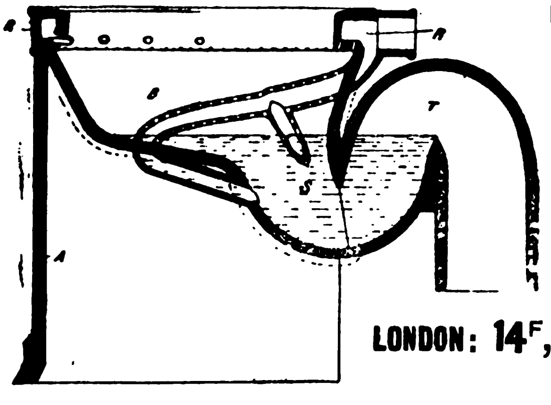

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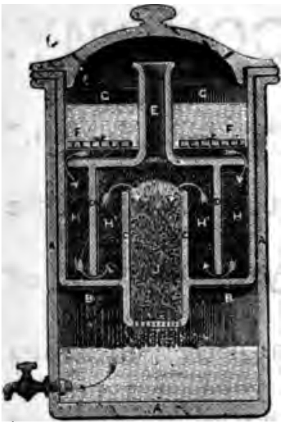

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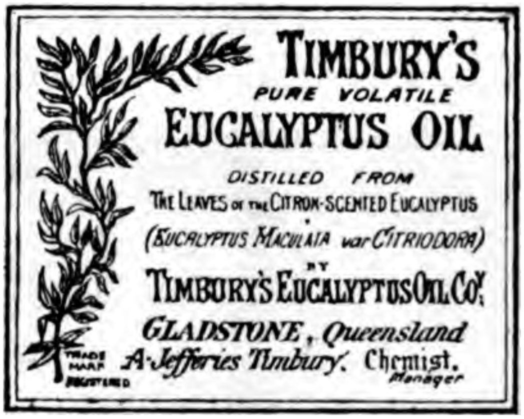

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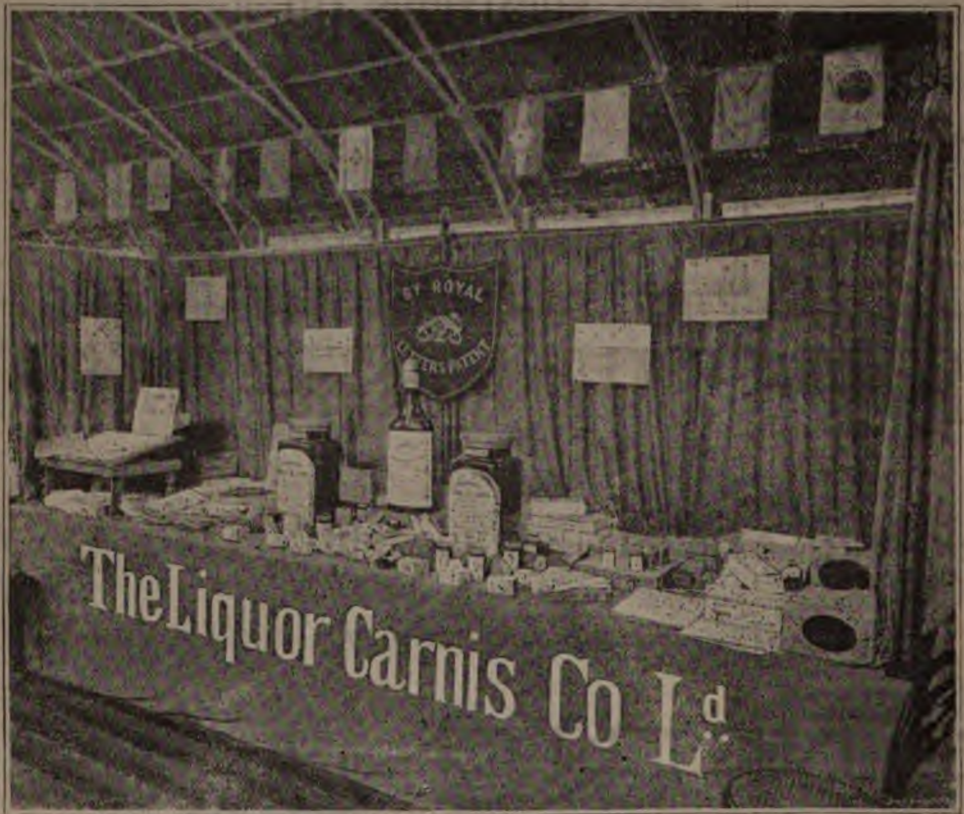

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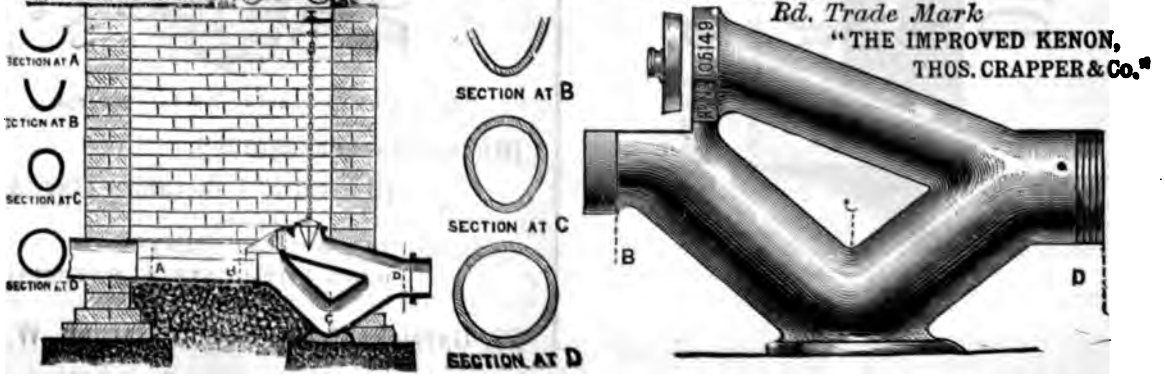

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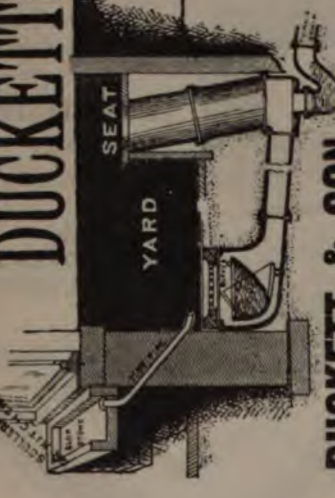

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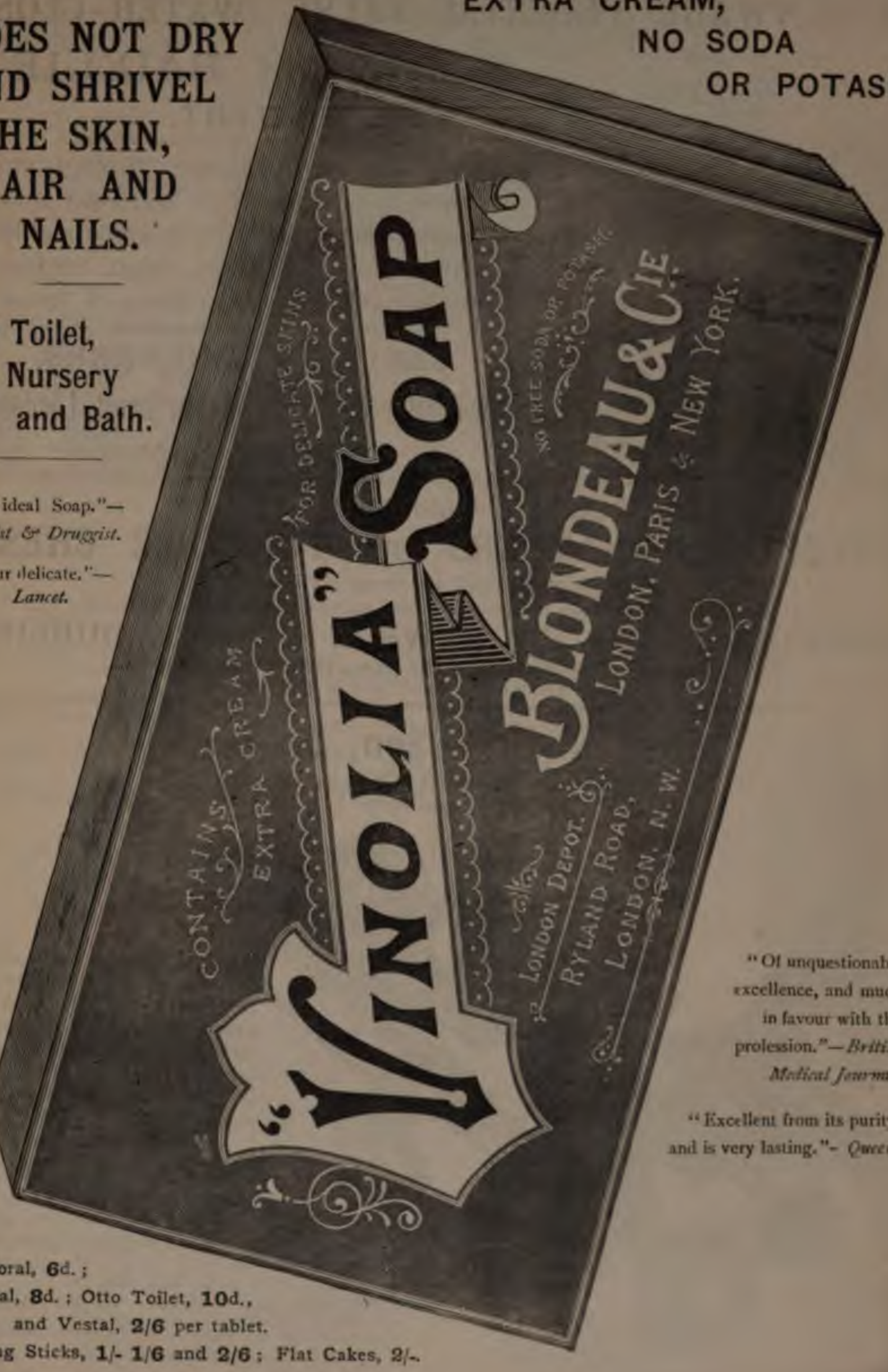

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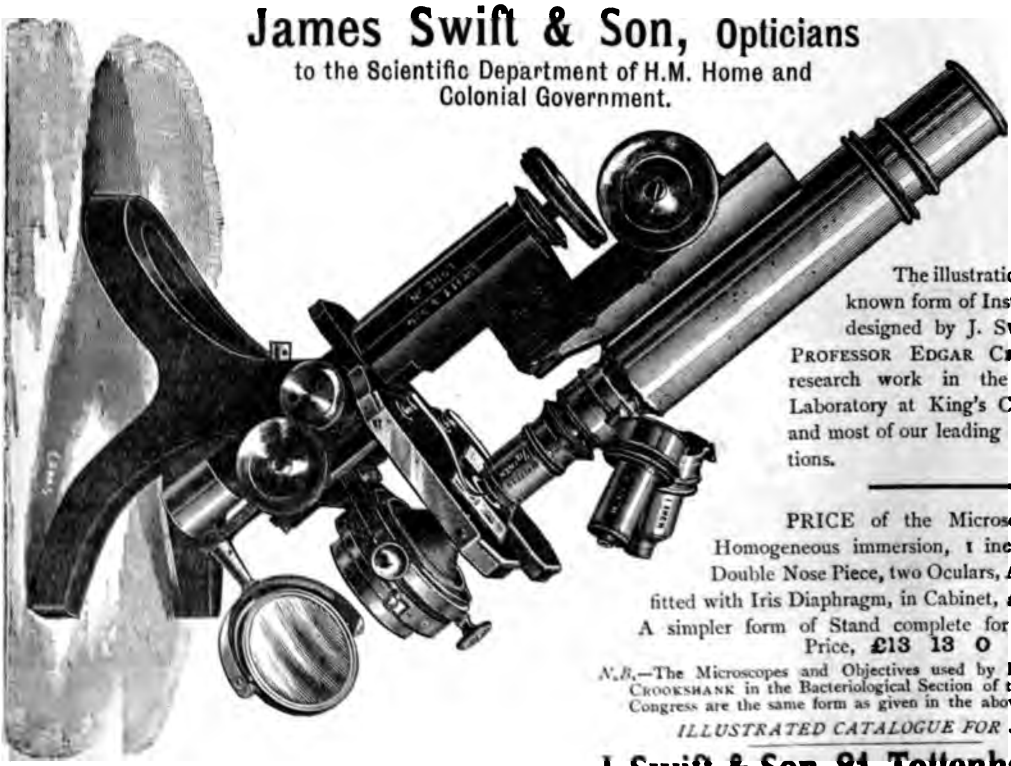

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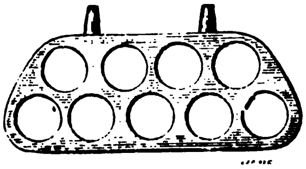

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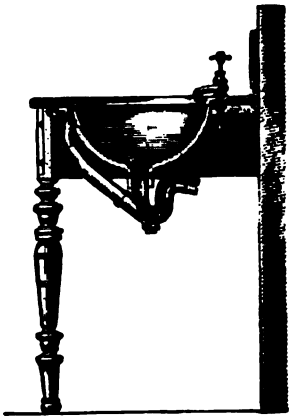

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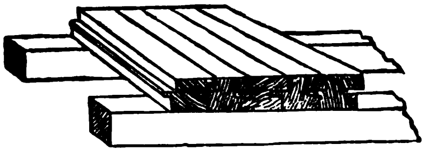

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